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LED LCD TV
SERVICE MANUAL

CHASSIS : LD2AZ

MODEL : 47LT660H 47LT660H-ZA

CAUTION
BEFORE SERVICING THE CHASSIS,
READ THE SAFETY PRECAUTIONS IN THIS MANUAL.

P/NO : MFL67368110 (1212-REV00)

Printed in Korea

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SCHEMATIC CIRCUIT DIAGRAM .....

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SAFETY PRECAUTIONS

IMPORTANT SAFETY NOTICE

Many electrical and mechanical parts in this chassis have special safety-related characteristics. These parts are identified by ⚠ in the Schematic Diagram and Exploded View.
It is essential that these special safety parts should be replaced with the same components as recommended in this manual to prevent Shock, Fire, or other Hazards.
Do not modify the original design without permission of manufacturer.

General Guidance

An **isolation Transformer should always be used** during the servicing of a receiver whose chassis is not isolated from the AC power line. Use a transformer of adequate power rating as this protects the technician from accidents resulting in personal injury from electrical shocks.

It will also protect the receiver and it's components from being damaged by accidental shorts of the circuitry that may be inadvertently introduced during the service operation.

If any fuse (or Fusible Resistor) in this TV receiver is blown, replace it with the specified.

When replacing a high wattage resistor (Oxide Metal Film Resistor, over 1 W), keep the resistor 10 mm away from PCB.

Keep wires away from high voltage or high temperature parts.

Before returning the receiver to the customer,

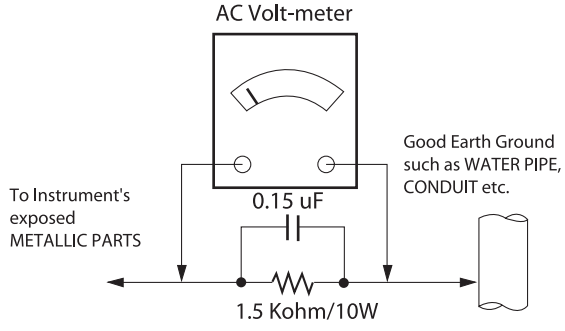
always perform an **AC leakage current check** on the exposed metallic parts of the cabinet, such as antennas, terminals, etc., to be sure the set is safe to operate without damage of electrical shock.

Leakage Current Cold Check(Antenna Cold Check)
With the instrument AC plug removed from AC source, connect an electrical jumper across the two AC plug prongs. Place the AC switch in the on position, connect one lead of ohm-meter to the AC plug prongs tied together and touch other ohm-meter lead in turn to each exposed metallic parts such as antenna terminals, phone jacks, etc.
If the exposed metallic part has a return path to the chassis, the measured resistance should be between 1 MΩ and 5.2 MΩ.
When the exposed metal has no return path to the chassis the reading must be infinite.
An other abnormality exists that must be corrected before the receiver is returned to the customer.

Leakage Current Hot Check (See below Figure)
Plug the AC cord directly into the AC outlet.

Do not use a line Isolation Transformer during this check.
Connect 1.5 K / 10 watt resistor in parallel with a 0.15 uF capacitor between a known good earth ground (Water Pipe, Conduit, etc.) and the exposed metallic parts.
Measure the AC voltage across the resistor using AC voltmeter with 1000 ohms/volt or more sensitivity.
Reverse plug the AC cord into the AC outlet and repeat AC voltage measurements for each exposed metallic part. Any voltage measured must not exceed 0.75 volt RMS which is corresponds to 0.5 mA.
In case any measurement is out of the limits specified, there is possibility of shock hazard and the set must be checked and repaired before it is returned to the customer.

Leakage Current Hot Check circuit



When 25A is impressed between Earth and 2nd Ground for 1 second, Resistance must be less than 0.1 Ω
*Base on Adjustment standard

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SERVICING PRECAUTIONS

CAUTION: Before servicing receivers covered by this service manual and its supplements and addenda, read and follow the *SAFETY PRECAUTIONS* on page 3 of this publication.
NOTE: If unforeseen circumstances create conflict between the following servicing precautions and any of the safety precautions on page 3 of this publication, always follow the safety precautions. Remember: Safety First.

General Servicing Precautions

1. Always unplug the receiver AC power cord from the AC power source before;
   a. Removing or reinstalling any component, circuit board module or any other receiver assembly.
   b. Disconnecting or reconnecting any receiver electrical plug or other electrical connection.
   c. Connecting a test substitute in parallel with an electrolytic capacitor in the receiver.
   CAUTION: A wrong part substitution or incorrect polarity installation of electrolytic capacitors may result in an explosion hazard.
2. Test high voltage only by measuring it with an appropriate high voltage meter or other voltage measuring device (DVM, FETVOM, etc) equipped with a suitable high voltage probe. Do not test high voltage by "drawing an arc".
3. Do not spray chemicals on or near this receiver or any of its assemblies.
4. Unless specified otherwise in this service manual, clean electrical contacts only by applying the following mixture to the contacts with a pipe cleaner, cotton-tipped stick or comparable non-abrasive applicator; 10 % (by volume) Acetone and 90 % (by volume) isopropyl alcohol (90 % - 99 % strength)
   CAUTION: This is a flammable mixture.
   Unless specified otherwise in this service manual, lubrication of contacts in not required.
5. Do not defeat any plug/socket B+ voltage interlocks with which receivers covered by this service manual might be equipped.
6. Do not apply AC power to this instrument and/or any of its electrical assemblies unless all solid-state device heat sinks are correctly installed.
7. Always connect the test receiver ground lead to the receiver chassis ground before connecting the test receiver positive lead.
   Always remove the test receiver ground lead last.
8. Use with this receiver only the test fixtures specified in this service manual.
   CAUTION: Do not connect the test fixture ground strap to any heat sink in this receiver.

Electrostatically Sensitive (ES) Devices

Some semiconductor (solid-state) devices can be damaged easily by static electricity. Such components commonly are called Electrostatically Sensitive (ES) Devices. Examples of typical ES devices are integrated circuits and some field-effect transistors and semiconductor “chip” components. The following techniques should be used to help reduce the incidence of component damage caused by static by static electricity.

1. Immediately before handling any semiconductor component or semiconductor-equipped assembly, drain off any electrostatic charge on your body by touching a known earth ground. Alternatively, obtain and wear a commercially available discharging wrist strap device, which should be removed to prevent potential shock reasons prior to applying power to the unit under test.
2. After removing an electrical assembly equipped with ES devices, place the assembly on a conductive surface such as aluminum foil, to prevent electrostatic charge buildup or exposure of the assembly.
3. Use only a grounded-tip soldering iron to solder or unsolder ES devices.
4. Use only an anti-static type solder removal device. Some solder removal devices not classified as “anti-static” can generate electrical charges sufficient to damage ES devices.
5. Do not use freon-propelled chemicals. These can generate electrical charges sufficient to damage ES devices.
6. Do not remove a replacement ES device from its protective package until immediately before you are ready to install it. (Most replacement ES devices are packaged with leads electrically shorted together by conductive foam, aluminum foil or comparable conductive material).
7. Immediately before removing the protective material from the leads of a replacement ES device, touch the protective material to the chassis or circuit assembly into which the device will be installed.
   CAUTION: Be sure no power is applied to the chassis or circuit, and observe all other safety precautions.
8. Minimize bodily motions when handling unpackaged replacement ES devices. (Otherwise harmless motion such as the brushing together of your clothes fabric or the lifting of your foot from a carpeted floor can generate static electricity sufficient to damage an ES device.)

General Soldering Guidelines

1. Use a grounded-tip, low-wattage soldering iron and appropriate tip size and shape that will maintain tip temperature within the range or 500 °F to 600 °F.
2. Use an appropriate gauge of RMA resin-core solder composed of 60 parts tin/40 parts lead.
3. Keep the soldering iron tip clean and well tinned.
4. Thoroughly clean the surfaces to be soldered. Use a mall wire-bristle (0.5 inch, or 1.25 cm) brush with a metal handle. Do not use freon-propelled spray-on cleaners.
5. Use the following unsoldering technique
   a. Allow the soldering iron tip to reach normal temperature. (500 °F to 600 °F)
   b. Heat the component lead until the solder melts.
   c. Quickly draw the melted solder with an anti-static, suction-type solder removal device or with solder braid.
   CAUTION: Work quickly to avoid overheating the circuit board printed foil.
6. Use the following soldering technique.
   a. Allow the soldering iron tip to reach a normal temperature (500 °F to 600 °F)
   b. First, hold the soldering iron tip and solder the strand against the component lead until the solder melts.
   c. Quickly move the soldering iron tip to the junction of the component lead and the printed circuit foil, and hold it there only until the solder flows onto and around both the component lead and the foil.
   CAUTION: Work quickly to avoid overheating the circuit board printed foil.
   d. Closely inspect the solder area and remove any excess or splashed solder with a small wire-bristle brush.

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IC Remove/Replacement
Some chassis circuit boards have slotted holes (oblong) through which the IC leads are inserted and then bent flat against the circuit foil. When holes are the slotted type, the following technique should be used to remove and replace the IC. When working with boards using the familiar round hole, use the standard technique as outlined in paragraphs 5 and 6 above.

Removal
1. Desolder and straighten each IC lead in one operation by gently prying up on the lead with the soldering iron tip as the solder melts.
2. Draw away the melted solder with an anti-static suction-type solder removal device (or with solder braid) before removing the IC.

Replacement
1. Carefully insert the replacement IC in the circuit board.
2. Carefully bend each IC lead against the circuit foil pad and solder it.
3. Clean the soldered areas with a small wire-bristle brush. (It is not necessary to reapply acrylic coating to the areas).

"Small-Signal" Discrete Transistor Removal/Replacement
1. Remove the defective transistor by clipping its leads as close as possible to the component body.
2. Bend into a "U" shape the end of each of three leads remaining on the circuit board.
3. Bend into a "U" shape the replacement transistor leads.
4. Connect the replacement transistor leads to the corresponding leads extending from the circuit board and crimp the "U" with long nose pliers to insure metal to metal contact then solder each connection.

Power Output, Transistor Device
Removal/Replacement
1. Heat and remove all solder from around the transistor leads.
2. Remove the heat sink mounting screw (if so equipped).
3. Carefully remove the transistor from the heat sink of the circuit board.
4. Insert new transistor in the circuit board.
5. Solder each transistor lead, and clip off excess lead.
6. Replace heat sink.

Diode Removal/Replacement
1. Remove defective diode by clipping its leads as close as possible to diode body.
2. Bend the two remaining leads perpendicular y to the circuit board.
3. Observing diode polarity, wrap each lead of the new diode around the corresponding lead on the circuit board.
4. Securely crimp each connection and solder it.
5. Inspect (on the circuit board copper side) the solder joints of the two "original" leads. If they are not shiny, reheat them and if necessary, apply additional solder.

Fuse and Conventional Resistor
Removal/Replacement
1. Clip each fuse or resistor lead at top of the circuit board hollow stake.
2. Securely crimp the leads of replacement component around notch at stake top.
3. Solder the connections.
   CAUTION: Maintain original spacing between the replaced component and adjacent components and the circuit board to prevent excessive component temperatures.

Circuit Board Foil Repair
Excessive heat applied to the copper foil of any printed circuit board will weaken the adhesive that bonds the foil to the circuit board causing the foil to separate from or "lift-off" the board. The following guidelines and procedures should be followed whenever this condition is encountered.

At IC Connections
To repair a defective copper pattern at IC connections use the following procedure to install a jumper wire on the copper pattern side of the circuit board. (Use this technique only on IC connections).

1. Carefully remove the damaged copper pattern with a sharp knife. (Remove only as much copper as absolutely necessary).
2. carefully scratch away the solder resist and acrylic coating (if used) from the end of the remaining copper pattern.
3. Bend a small "U" in one end of a small gauge jumper wire and carefully crimp it around the IC pin. Solder the IC connection.
4. Route the jumper wire along the path of the out-away copper pattern and let it overlap the previously scraped end of the good copper pattern. Solder the overlapped area and clip off any excess jumper wire.

At Other Connections
Use the following technique to repair the defective copper pattern at connections other than IC Pins. This technique involves the installation of a jumper wire on the component side of the circuit board.

1. Remove the defective copper pattern with a sharp knife. Remove at least 1/4 inch of copper, to ensure that a hazardous condition will not exist if the jumper wire opens.
2. Trace along the copper pattern from both sides of the pattern break and locate the nearest component that is directly connected to the affected copper pattern.
3. Connect insulated 20-gauge jumper wire from the lead of the nearest component on one side of the pattern break to the lead of the nearest component on the other side.
   Carefully crimp and solder the connections.
   CAUTION: Be sure the insulated jumper wire is dressed so the it does not touch components or sharp edges.

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SPECIFICATION

NOTE : Specifications and others are subject to change without notice for improvement.

1. Application range

This specification is applied to the LCD TV used LD2AY/Z chassis.

2. Requirement for Test

Each part is tested as below without special appointment.

1) Temperature: 25 °C ± 5 °C(77 °F ± 9 °F), CST: 40 °C ± 5 °C
2) Relative Humidity: 65 % ± 10 %
3) Power Voltage
   : Standard input voltage (AC 100-240 V~, 50/60 Hz)
   * Standard Voltage of each products is marked by models.
4) Specification and performance of each parts are followed each drawing and specification by part number in accordance with BOM.
5) The receiver must be operated for about 5 minutes prior to the adjustment.

3. Test method

1) Performance: LGE TV test method followed
2) Demanded other specification
   - Safety : CE, IEC specification
   - EMC : CE, IEC

4. Model General Specification

No.	Item	Specification	Remarks
1	Market	EU(PAL Market-37Countries)	**DTV & Analog (Total 36 countries)** DTV (MPEG2/4, DVB-T) :37 countries UK/Italy/Germany/France/Spain/Sweden/Finland/Netherlands/ Belgium/Luxemburg/ Greece/Denmark/Czech/ Austria /Hungary/Swiss/Croatia/Turkey Norway/Slovenia/Poland/Ukraine/Portugal/Ireland/Morocco/ Latvia/Estonia/Lithania/Rumania/Bulgaria/Russia/Slovakia Bosnia/Serbia/Albania/Kazakhstan/Belarus **DTV (MPEG2/4, DVB-C): 37 countries** UK/Italy/Germany/France/Spain/Sweden/Finland/Netherlands/ Belgium/Luxemburg/ Greece/Denmark/Czech/ Austria /Hungary/Swiss/Croatia/Turkey Norway/Slovenia/Poland/Ukraine/Portugal/Ireland/Morocco/ Latvia/Estonia/Lithania/Rumania/Bulgaria/Russia/Slovakia Bosnia/Serbia/Albania/Kazakhstan/Belarus
2.	Broadcasting system	1) PAL-BG 2) PAL-DK 3) SECAM L/L' 4) DVB-T//C	
3	Receiving system	Analog : Upper Heterodyne Digital : COFDM , QAM	► DVB-T - Guard Interval(Bitrate_Mbit/s) 1/4, 1/8, 1/16, 1/32 - Modulation : Code Rate QPSK : 1/2, 2/3, 3/4, 5/6, 7/8 16-QAM : 1/2, 2/3, 3/4, 5/6, 7/8 64-QAM : 1/2, 2/3, 3/4, 5/6, 7/8 ► DVB-C - Symbolrate : 4.0Msymbols/s to 7.2Msymbols/s - Modulation : 16QAM, 64-QAM, 128-QAM and 256-QAM
4	Scart Jack (1EA)	PAL, SECAM	Scart 1 Jack is Full scart and support RF-OUT(analog).
5	Component Input (1EA)	Y/Cb/Cr Y/Pb/Pr	

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No.	Item	Specification	Remarks
6	RGB Input	RGB-PC	Analog(D-SUB 15PIN)
7	HDMI Input (3EA)	HDMI1-DTV/DVI HDMI2-DTV HDMI3-DTV	PC(HDMI version 1.3) Support HDCP The number of Input ports is different by model.
8	Audio Input (2EA)	RGB/DVI Audio	In case of the RGB/DVI Audio input,
9	SDPIF out (1EA)	SPDIF out	Some models(LD21A,LD21C) are not supported.
10	Earphone out (1EA)	Antenna, AV1, AV2, Component, RGB, HDMI1, HDMI2, HDMI3	.
11	USB (1EA)	EMF, DivX HD, For SVC (download)	JPEG, MP3, DivX HD
12	DVB	DVB-T	CI : UK, Finland, Denmark, Norway, Sweden, Russia, Spain, Ireland, Luxemburg, Belgium, Netherland CI+ : France(Canal+), Italy(DGTVi)
		DVB-C	CI : Switzerland, Austria, Slovenia, Hungary, Bulgaria CI+ : Switzerland(UPC,Cablecom), Netherland(Ziggo), Germany(KDG,CWB), Finland(labwise)
13	RS232C (1EA)	Interactive mode support	

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5. Video resolutions (2D)

5.1. Component Input (Y, C_B/P_B, C_R/P_R)

No.	Resolution	H-freq(kHz)	V-freq(Hz)	Pixel clock(MHz)	Proposed
1	720*480	15.73	60.00	13.5135	SDTV ,DVD 480I
2	720*480	15.73	59.94	13.50	SDTV ,DVD 480I
3	720*480	31.50	60.00	27.027	SDTV 480P
4	720*480	31.47	59.94	27.00	SDTV 480P
5	1280*720	45.00	60.00	74.25	HDTV 720P
6	1280*720	44.96	59.94	74.176	HDTV 720P
7	1920*1080	33.75	60.00	74.25	HDTV 1080I
8	1920*1080	33.72	59.94	74.176	HDTV 1080I
9	1920*1080	67.50	60.00	148.50	HDTV 1080P
10	1920*1080	67.432	59.94	148.352	HDTV 1080P
11	1920*1080	27.00	24.00	74.25	HDTV 1080P
12	1920*1080	26.97	23.94	74.176	HDTV 1080P
13	1920*1080	33.75	30.00	74.25	HDTV 1080P
14	1920*1080	33.71	29.97	74.176	HDTV 1080P

5.2. RGB Input (PC)

No.	Resolution	H-freq(kHz)	V-freq.(Hz)	Pixel clock(MHz)	Proposed	DDC
1	640*350	31.468	70.09	25.17	EGA	X
2	720*400	31.469	70.08	28.32	DOS	O
3	640*480	31.469	59.94	25.17	VESA(VGA)	O
4	800*600	37.879	60.31	40.00	VESA(SVGA)	O
5	1024*768	48.363	60.00	65.00	VESA(XGA)	O
6	1280*768	47.776	59.870	79.50	VESA	O
7	1360*768	47.712	60.015	85.50	VESA (WXGA)	O
8	1280*1024	63.981	60.020	108.0	HDTV 1080P	O
9	1600*1200	75.00	60.00	162.0		
10	1920*1080	66.587	59.934	138.5		

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5.3. HDMI Input(PC/DTV)

No.	Resolution	H-freq(kHz)	V-freq.(Hz)	Pixel clock(MHz)	Proposed		Remark
PC(DVI)					DDC		
1	640*350	31.468	70.09	25.17	EGA	X	
2	720*400	31.469	70.08	28.32	DOS	O	
3	640*480	31.469	59.94	25.17	VESA(VGA)	O	
4	800*600	37.879	60.31	40.00	VESA(SVGA)	O	
5	1024*768	48.363	60.00	65.00	VESA(XGA)	O	
6	1280*768	47.776	59.870	79.50	CVT(WXGA)	X	
7	1360*768	47.712	60.015	85.50	VESA (WXGA)	O	
8	1280*1024	63.981	60.020	108.0	VESA (SXGA)	O	
9	1600*1200	75.00	60.00	162.0	VESA (UXGA)	X	
10	1920*1080	67.50	60.00	148.5	HDTV 1080P	O	
DTV							
1	720*480	31.50	60.00	27.027	SDTV 480P		
2	720*480	31.47	59.94	27.00	SDTV 480P		
3	1280*720	45.00	60.00	74.25	HDTV 720P		
4	1280*720	44.96	59.94	74.176	HDTV 720P		
5	1920*1080	33.75	60.00	74.25	HDTV 1080I		
6	1920*1080	33.72	59.94	74.176	HDTV 1080I		
7	1920*1080	67.50	60.00	148.50	HDTV 1080P		
8	1920*1080	67.432	59.94	148.352	HDTV 1080P		
9	1920*1080	27.00	24.00	74.25	HDTV 1080P		
10	1920*1080	26.97	23.976	74.176	HDTV 1080P		
11	1920*1080	33.75	30.00	74.25	HDTV 1080P		

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ADJUSTMENT INSTRUCTION

1. Application Range

This specification sheet is applied to all of the LCD TV with LD2AY/Z chassis.

2. Designation

(1) The adjustment is according to the order which is designated and which must be followed, according to the plan which can be changed only on agreeing.
(2) Power adjustment : Free Voltage.
(3) Magnetic Field Condition: Nil.
(4) Input signal Unit: Product Specification Standard.
(5) Reserve after operation : Above 5 Minutes (Heat Run)
Temperature : at 25 °C ± 5 °C
Relative humidity : 65 ± 10 %
Input voltage : 220 V, 60 Hz
(6) Adjustment equipments: Color Analyzer(CA-210 or CA-110), DDC Adjustment Jig, Service remote control.
(7) Push the "IN STOP" key - For memory initialization.

Case1 : Software version up
1. After downloading S/W by USB , TV set will reboot automatically.
2. Push “In-stop” key.
3. Push “Power on” key.
4. Function inspection
5. After function inspection, Push “In-stop” key.

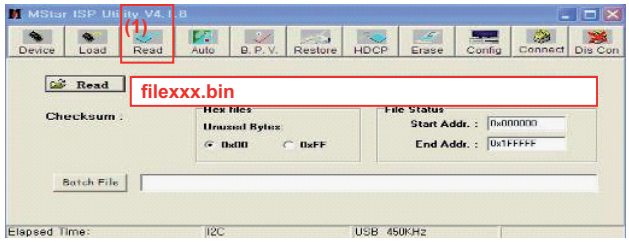
Case2 : Function check at the assembly line
1. When TV set is entering on the assembly line, Push “In-stop” key at first.
2. Push “Power on” key for turning it on.
→ If you push “Power on” key, TV set will recover channel information by itself.
3. After function inspection, Push “In-stop” key.

3. Main PCB check process

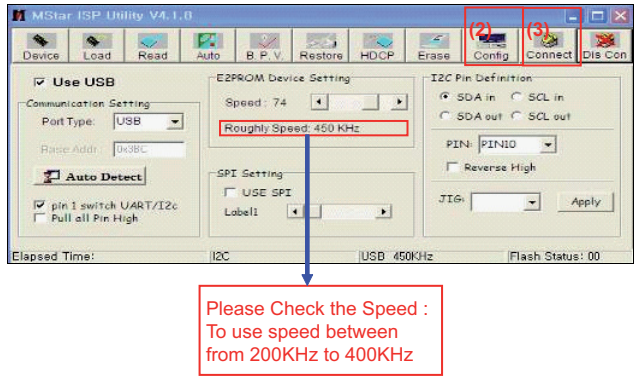
▪ APC - After Manual-Insert, executing APC

* Boot file Download

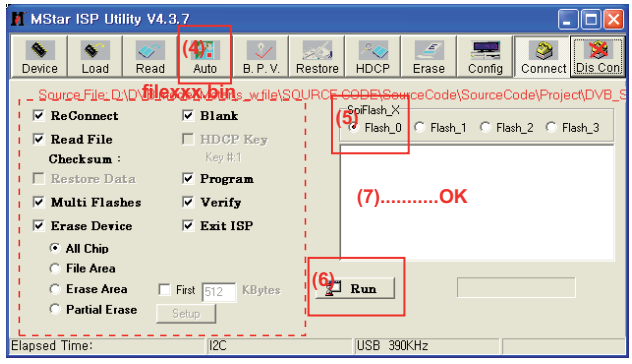
(1) Execute ISP program "Mstar ISP Utility" and then click "Config" tab.
(2) Set as below, and then click "Auto Detect" and check "OK" message.
If "Error" is displayed, check connection between computer, jig, and set.
(3) Click "Read" tab, and then load download file(XXXX.bin) by clicking "Read"



(4) Click "Connect" tab. If "Can't" is displayed, check connection between computer, jig, and set.

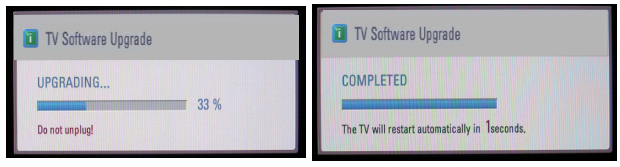


(5) Click "Auto" tab and set as below.
(6) Click "Run".
(7) After downloading, check "OK" message.



* USB DOWNLOAD

(1) Put the USB Stick to the USB socket.
(2) Automatically detecting update file in USB Stick.
- If your downloaded program version in USB Stick is Low, it didn't work. But your downloaded version is High, USB data is automatically detecting.
(3) Show the message "Copying files from memory".
(4) Updating is starting.



(5) Updating Completed, The TV will restart automatically.
(6) If your TV is turned on, check your updated version and Tool option. (explain the Tool option, next stage)
* If downloading version is more high than your TV have, TV can lost all channel data. In this case, you have to channel recover. if all channel data is cleared, you didn’t have a DTV/ATV test on production line.

* After downloading, have to adjust Tool Option again.
(1) Push "IN-START" key in service remote control.
(2) Select "Tool Option 1" and push "OK" key.
(3) Punch in the number. (Each model has their number)

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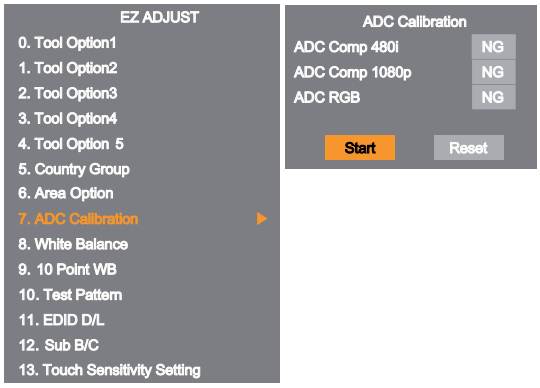
3.1. ADC Process

(1) ADC

- Enter Service Mode by pushing "ADJ" key,
- Enter Internal ADC mode by pushing "►" key at "7. ADC Calibration".



<Caution> Using "P-ONLY" key of the Adjustment remote control, power on TV.

If there is no Component Input, disappear “ADC Comp” message.

* ADC Calibration Protocol (RS232)

NO	Item	CMD 1	CMD 2	Data 0		
Enter Adjust MODE	Adjust ‘Mode In’	A	A	0	0	When transfer the ‘Mode In’, Carry the command.
ADC adjust	ADC Adjust	A	D	1	0	Automatically adjustment (The use of a internal pattern)

Adjust Sequence

- aa 00 00 [Enter Adjust Mode]
- xb 00 40 [Component1 Input (480i)]
- ad 00 10 [Adjust 480i Comp1]
- xb 00 60 [RGB Input (1024*768)] (only LD21B)
- ad 00 10 [Adjust 1024*768 RGB] (only LD21B)
- aa 00 90 End Adjust mode

* Required equipment : Adjustment remote control.

3.2. Function Check

3.2.1. Check display and sound

■ Check Input and Signal items. (cf. work instructions)

1. TV
2. AV
3. COMPONENT (480i)
4. RGB (PC : 1024 x 768 @ 60hz)
5. HDMI
6. PC Audio In

* Display and Sound check is executed by Remote controller

Caution : Not to push the INSTOP KEY after completion if the function inspection.

4. Total Assembly line process

4.1. Adjustment Preparation

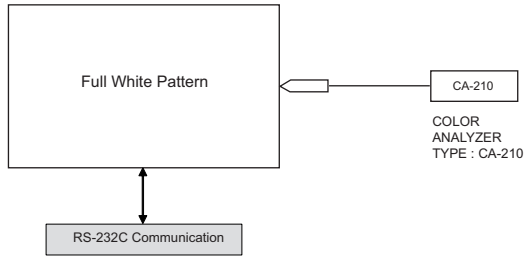
- W/B Equipment condition
  CA210
  : CCFL/EEFL -> CH9, Test signal: Inner pattern(80IRE)
  LED -> CH14, Test signal: Inner pattern(80IRE)
- Above 5 minutes H/run in the inner pattern. (“power on” key of adjust remote control)

Cool	13,000	K	X=0.269 (±0.002) Y=0.273 (±0.002)	<Test Signal> Inner pattern (204gray, 80IRE)
Medium	9,300	K	X=0.285 (±0.002) Y=0.293 (±0.002)	
Warm	6,500	K	X=0.313 (±0.002) Y=0.329 (±0.002)	

- Edge LED W/B Table in process of aging time (Only LGD Edge LED Module except AUO, CMI, IPS Module)
  CA210 : CH 14, Test signal : Inner pattern (80IRE)

GP4	Aging time (Min)	Cool		Medium		Warm	
		X	y	x	y	x	y
		269	273	285	293	313	329
1	0-2	279	288	295	308	319	338
2	3-5	278	286	294	306	318	336
3	6-9	277	285	293	305	317	335
4	10-19	276	283	292	303	316	333
5	20-35	274	280	290	300	314	330
6	36-49	272	277	288	297	312	327
7	50-79	271	275	287	295	311	325
8	80-149	270	274	286	294	310	324
9	Over 150	269	273	285	293	309	323

* Connecting picture of the measuring instrument
(On Automatic control)
Inside PATTERN is used when W/B is controlled. Connect to auto controller or push Adjustment R/C POWER ON → Enter the mode of White-Balance, the pattern will come out.



* Auto-control interface and directions

(1) Adjust in the place where the influx of light like floodlight around is blocked. (illumination is less than 10 lux).

(2) Adhere closely the Color analyzer(CA210) to the module less than 10 cm distance, keep it with the surface of the Module and Color analyzer's prove vertically.(80° ~ 100°).

(3) Aging time

- After aging start, keep the power on (no suspension of power supply) and heat-run over 5 minutes.
- Using 'no signal' or 'POWER ONLY' or the others, check the back light on.

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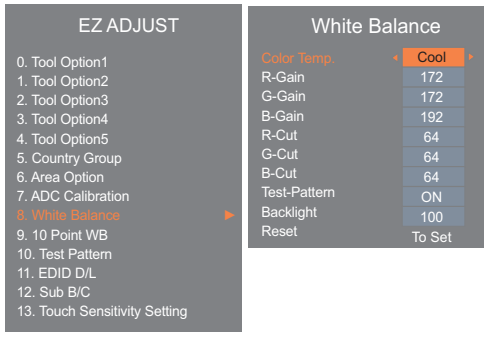
▪ Auto adjustment Map(using RS-232C to USB cable)
RS-232C COMMAND
[CMD ID DATA]
Wb 00 00 White Balance Start
Wb 00 ff White Balance End

	RS-232C COMMAND [CMD ID DATA]			MIN	CENTER (DEFAULT)			MAX
	Cool	Mid	Warm		Cool	Mid	Warm	
R Gain	jg	Ja	jd	00	172	192	192	192
G Gain	jh	Jb	je	00	172	192	192	192
B Gain	ji	Jc	jf	00	192	192	172	192
R Cut					64	64	64	128
G Cut					64	64	64	128
B Cut					64	64	64	128

<Caution>
Color Temperature : COOL, Medium, Warm.
One of R Gain/G Gain/ B Gain should be kept on 0xC0, and adjust other two lower than C0.(When R/G/B Gain are all C0, it is the FULL Dynamic Range of Module)

*** Manual W/B process using adjust Remote control.**
▪ After enter Service Mode by pushing "ADJ" key,
▪ Enter White Balance by pushing "▶" key at "8. White Balance".



* After you finished all adjustments, Press "In-start" key and compare Tool option and Area option value with its BOM, if it is correctly same then unplug the AC cable. If it is not same, then correct it same with BOM and unplug AC cable. For correct it to the model's module from factory Jig model.
* Push the "IN STOP" key after completing the function inspection. And Mechanical Power Switch must be set “ON”.

4.2. DDC EDID Write (RGB 128Byte)

■ Connect D-sub Signal Cable to D-Sub Jack.
■ Write EDID DATA to EEPROM (24C02) by using DDC2B protocol.
■ Check whether written EDID data is correct or not.
* For Service main Assembly, EDID have to be downloaded to Insert Process in advance.

4.3 DDC EDID Write (HDMI 256Byte)

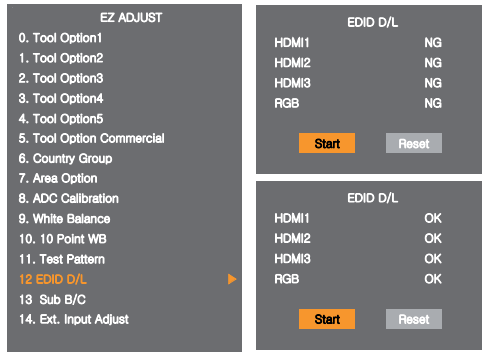
■ Connect HDMI Signal Cable to HDMI Jack.
■ Write EDID DATA to EEPROM(24C02) by using DDC2B protocol.
■ Check whether written EDID data is correct or not.
* For Service main Assembly, EDID have to be downloaded to Insert Process in advance.

4.4. EDID data

(1) All Data : HEXA Value
(2) Changeable Data :
*: Serial No : Controlled / Data:01
**: Month : Controlled / Data:00
***:Year : Controlled
****:Check sum

4.4.1. Auto Download

■ After enter Service Mode by pushing “ADJ” key,
■ Enter EDID D/L mode.
■ Enter “START” by pushing “OK” key.
* Caution : Never connect HDMI & D-sub Cable when EDID downloaded.



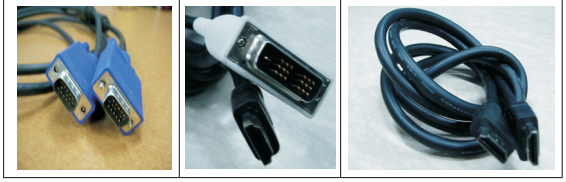
* EDID data and Model option download (RS232)

NO	Item	CMD 1	CMD 2	Data 0		
Enter download MODE	Download ‘Mode In’	A	A	0	0	When transfer the ‘Mode In’, Carry the command.
EDID data and Model option download	Download	A	E	00	10	Automatically download (The use of a internal data)

4.4.2. Manual Download

<Caution>
(1) Use the proper signal cable for EDID Download
- Analog EDID : Pin3 exists
- Digital EDID : Pin3 exists
(2) Never connect HDMI & D-sub Cable at the same time.
(3) Use the proper cables below for EDID Writing.
(4) Download HDMI1, HDMI2 separately because HDMI1 is different from HDMI2.

For Analog	For HDMI EDID
D-sub to D-sub	DVI-D to HDMI or HDMI to HDMI



No.	Item	Condition	Hex Data
1	Manufacturer ID	GSM	1E6D
2	Version	Digital : 1	01
3	Revision	Digital : 3	03

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(1) FHD RGB EDID data

	0	1	2	3	4	5	6	7	8	9	A	B	C	D	E	F
00	00	FF	FF	FF	FF	FF	FF	00	1E	6D	a		b			
10	c		01	03	68	10	09	78	0A	EE	91	A3	54	4C	99	26
20	0F	50	54	A1	08	00	81	80	61	40	45	40	31	40	01	01
30	01	01	01	01	01	01	02	3A	80	18	71	38	2D	40	58	2C
40	45	00	A0	5A	00	00	00	1E	01	1D	00	72	51	D0	1E	20
50	6E	28	55	00	A0	5A	00	00	00	1E	00	00	00	FD	00	3A
60	3E	1E	53	10	00	0A	20	20	20	20	20	20	d			
70	d														00	e
80	FF	FF	FF	FF	FF	FF	FF	FF	FF	FF	FF	FF	FF	FF	FF	FF
90	FF	FF	FF	FF	FF	FF	FF	FF	FF	FF	FF	FF	FF	FF	FF	FF
A0	FF	FF	FF	FF	FF	FF	FF	FF	FF	FF	FF	FF	FF	FF	FF	FF
B0	FF	FF	FF	FF	FF	FF	FF	FF	FF	FF	FF	FF	FF	FF	FF	FF
C0	FF	FF	FF	FF	FF	FF	FF	FF	FF	FF	FF	FF	FF	FF	FF	FF
D0	FF	FF	FF	FF	FF	FF	FF	FF	FF	FF	FF	FF	FF	FF	FF	FF
E0	FF	FF	FF	FF	FF	FF	FF	FF	FF	FF	FF	FF	FF	FF	FF	FF
F0	FF	FF	FF	FF	FF	FF	FF	FF	FF	FF	FF	FF	FF	FF	FF	FF

(2) FHD HDMI EDID data

	0	1	2	3	4	5	6	7	8	9	A	B	C	D	E	F
00	00	FF	FF	FF	FF	FF	FF	00	1E	6D	a		b			
10	c		01	03	80	10	09	78	0A	EE	91	A3	54	4C	99	26
20	0F	50	54	A1	08	00	71	4F	81	80	01	01	01	01	01	01
30	01	01	01	01	01	01	02	3A	80	18	71	38	2D	40	58	2C
40	45	00	A0	5A	00	00	00	1E	1B	21	50	A0	51	00	1E	30
50	48	88	35	00	A0	5A	00	00	00	1C	00	00	00	FD	00	3A
60	3E	1E	53	10	00	0A	20	20	20	20	20	20	d			
70	d														01	e
80	02	03	26	F1	4E	10	1F	84	13	05	14	03	02	12	20	21
90	22	15	01	26	15	07	50	09	57	07	f					
A0	f		E3	05	03	01	01	1D	80	18	71	1C	16	20	58	2C
B0	25	00	A0	5A	00	00	00	9E	01	1D	00	72	51	D0	1E	20
C0	6E	28	55	00	A0	5A	00	00	00	1E	02	3A	80	18	71	38
D0	2D	40	58	2C	45	00	A0	5A	00	00	00	1E	01	1D	00	BC
E0	52	D0	1E	20	B8	28	55	40	A0	5A	00	00	00	1E	00	00
F0	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00	e

(3) Detail EDID Options are below

a. Product ID

MODEL NAME	HEX	EDID Table	DDC Function
HD/FHD Model	0001	01 00	Analog/Digital

b. Serial No: Controlled on production line.

c. Month, Year: Controlled on production line:

ex) Week : '01' -> '01'

Year : '2012' -> '16' fix

d. Model Name(Hex):

cf) TV set's model name in EDID data is below.

Model name	MODEL NAME(HEX)
LG TV	00 00 00 FC 00 4C 47 20 54 56 0A 20 20 20 20 20 20 20 (LG TV)

e. Checksum: Changeable by total EDID data.

EDID C/S data		FHD	
		HDMI	RGB
Check sum (Hex)	Block 0	43	5C
	Block 1	25 (HDMI1)	-
		15 (HDMI2)	
		5 (HDMI3)	

f. Vendor Specific(HDMI)

Input	Model name(HEX)
HDMI1	67030C001000B82D
HDMI2	67030C002000B82D
HDMI3	67030C003000B82D

4.5. Outgoing condition Configuration

■ When pressing IN-STOP key by SVC remocon, Red LED are blinked alternatively. And then automatically turn off. (Must not AC power OFF during blinking)

4.6. HI-POT Test

4.6.1. HI-POT auto-check preparation

- Check the POWER cable and SIGNAL cable insertion condition

4.6.2. HI-POT auto-check

(1) Pallet moves in the station. (POWER CORD / AV CORD is tightly inserted)

(2) Connect the AV JACK Tester.

(3) Controller (GWS103-4) on.

(4) HI-POT test (Auto)

- If Test is failed, Buzzer operates.
- If Test is passed, GOOD Lamp on and move to next process automatically.

4.6.3. Checkpoint

(1) Test voltage

- Touchable Metal : 3 KV / min at 100 mA
- SIGNAL : 3 KV / min at 100 mA

(2) TEST time: 1 second. (case : mass production)

(3) TEST POINT

- Touchable Metal => LIVE & NEUTRAL : Touchable Metal.
- SIGNAL => LIVE & NEUTRAL : SIGNAL.

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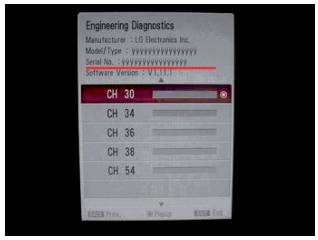
5. Model name & Serial number D/L

- Press "Power on" key of service remote control.
  (Baud rate : 115200 bps)
- Connect RS232 Signal Cable to RS-232 Jack.
- Write Serial number by use RS-232.
- Must check the serial number at the Product/Service info..
  (menu key -> red key -> select product/Service info)



5.1. Signal Table

CMD	LENGTH	ADH	ADL	DATA_1	. . .	Data_n	CS	DELAY

CMD : A0h
LENGTH : 85~94h (1~16 bytes)
ADH : EEPROM Sub Address high (00~1F)
ADL : EEPROM Sub Address low (00~FF)
Data : Write data
CS : CMD + LENGTH + ADH + ADL + Data_1 +...+ Data_n
Delay : 20ms

5.2. Comand Set

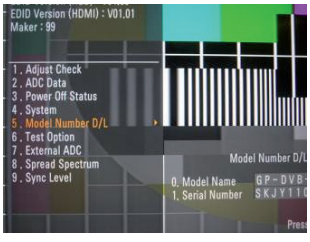
Adjust mode	CMD(hex)	LENGTH(hex)	Description
EEPROM WRITE	A0h	84h+n	n-bytes Write (n = 1~16)

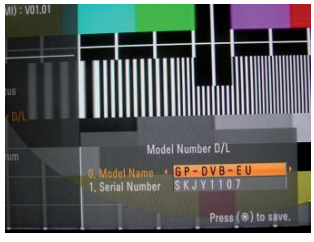
* Description
  FOS Default write : <7mode data> write
  Vtotal, V_Frequency, Sync_Polarity, Htotal, Hstart, Vstart, 0, Phase
  Data write : Model Name and Serial Number write in EEPROM,.

5.3. Method & notice

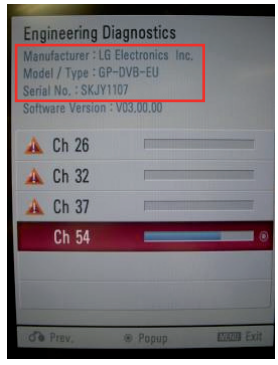
(1) Serial number D/L is using of scan equipment.
(2) Setting of scan equipment operated by Manufacturing Technology Group.
(3) Serial number D/L must be conformed when it is produced in production line, because serial number D/L is mandatory by D-book 4.0.

* Manual Download(Model Name and Serial Number)
  If the TV set is downloaded by OTA or Service man, sometimes model name or serial number is initialized.(Not always)
  There is impossible to download by bar code scan, so It need Manual download.
  1) Press the "Instart" key of Adjustment remote control.
  2) Go to the menu "6.Model Number D/L" like below photo.
  3) Input the Factory model name or Serial number like photo.





4) Check the model name Instart menu. → Factory name displayed. (ex 42LD450-ZA)
5) Check the Diagnostics.(DTV country only) → Buyer model displayed.(ex 42LD450)



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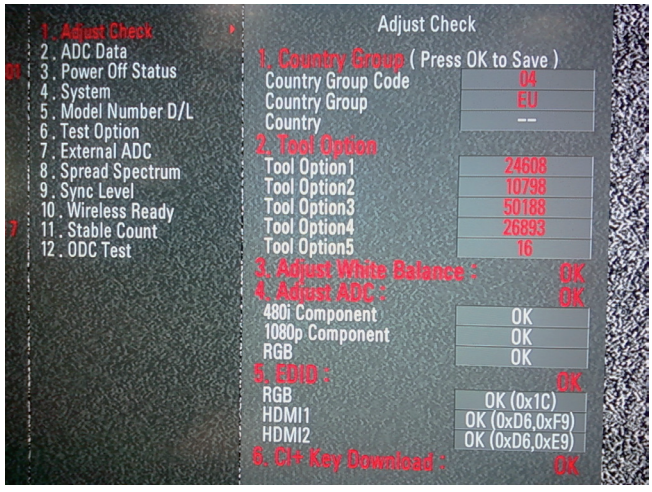
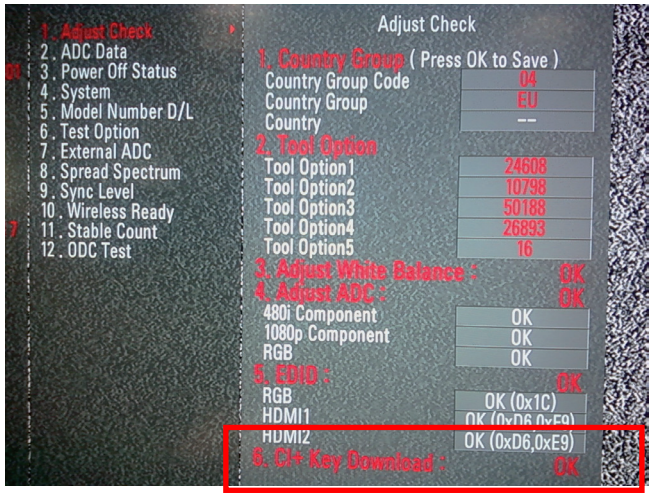
6. CI+ Key Download method

6.1. Download Procedure

(1) Press "Power on" key of a service R/C.
(Baud rate : 115200 bps)
(2) Connect RS232-C Signal Cable.
(3) Write CI+ Key through RS-232-C.
(4) Check whether the key was downloaded or not at 'In Start' menu. (Refer to below).



=> Check the Download to CI+ Key value in LGset.
1. Check the method of CI+ Key value
a. Check the method on Instart menu



b. Check the method of RS232C Command
1) Into the main ass'y mode (RS232 : aa 00 00)

CMD 1	CMD 2	Data 0	
A	A	0	0

2) Check the key download for transmitted command
(RS232 : ci 00 10)

CMD 1	CMD 2	Data 0	
C	I	1	0

3) Result value
- Normally status for download : OKx
- Abnormally status for download : NGx

2. Check the method of CI+ key value (RS232)
1) Into the main ass'y mode (RS232 : aa 00 00)

CMD 1	CMD 2	Data 0	
A	A	0	0

2) Check the mothed of CI+ key by command
(RS232 : ci 00 20)

CMD 1	CMD 2	Data 0	
C	I	2	0

3) result value
i 01 OK 1d1852d21c1ed5dcx
CI+ Key Value

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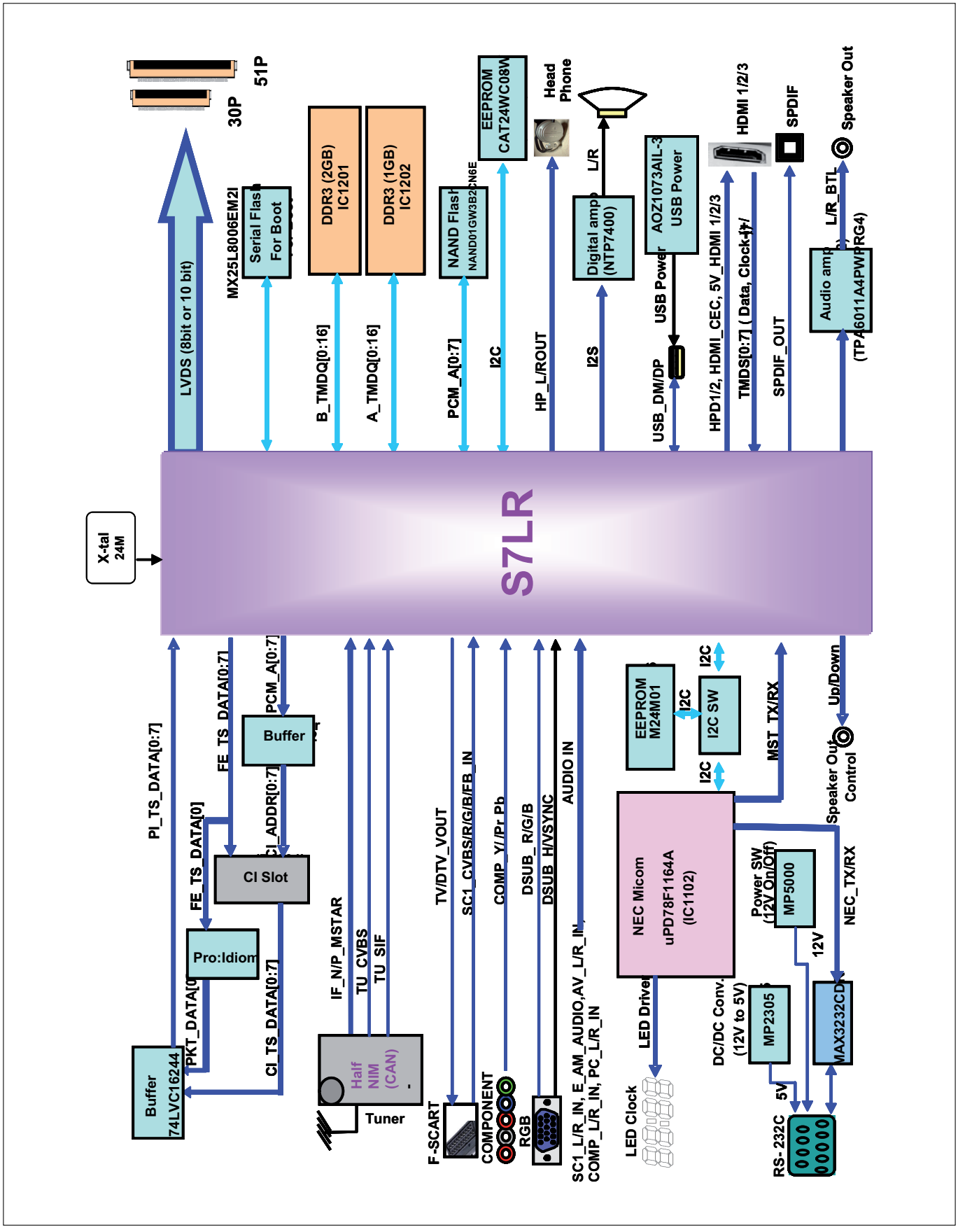
BLOCK DIAGRAM



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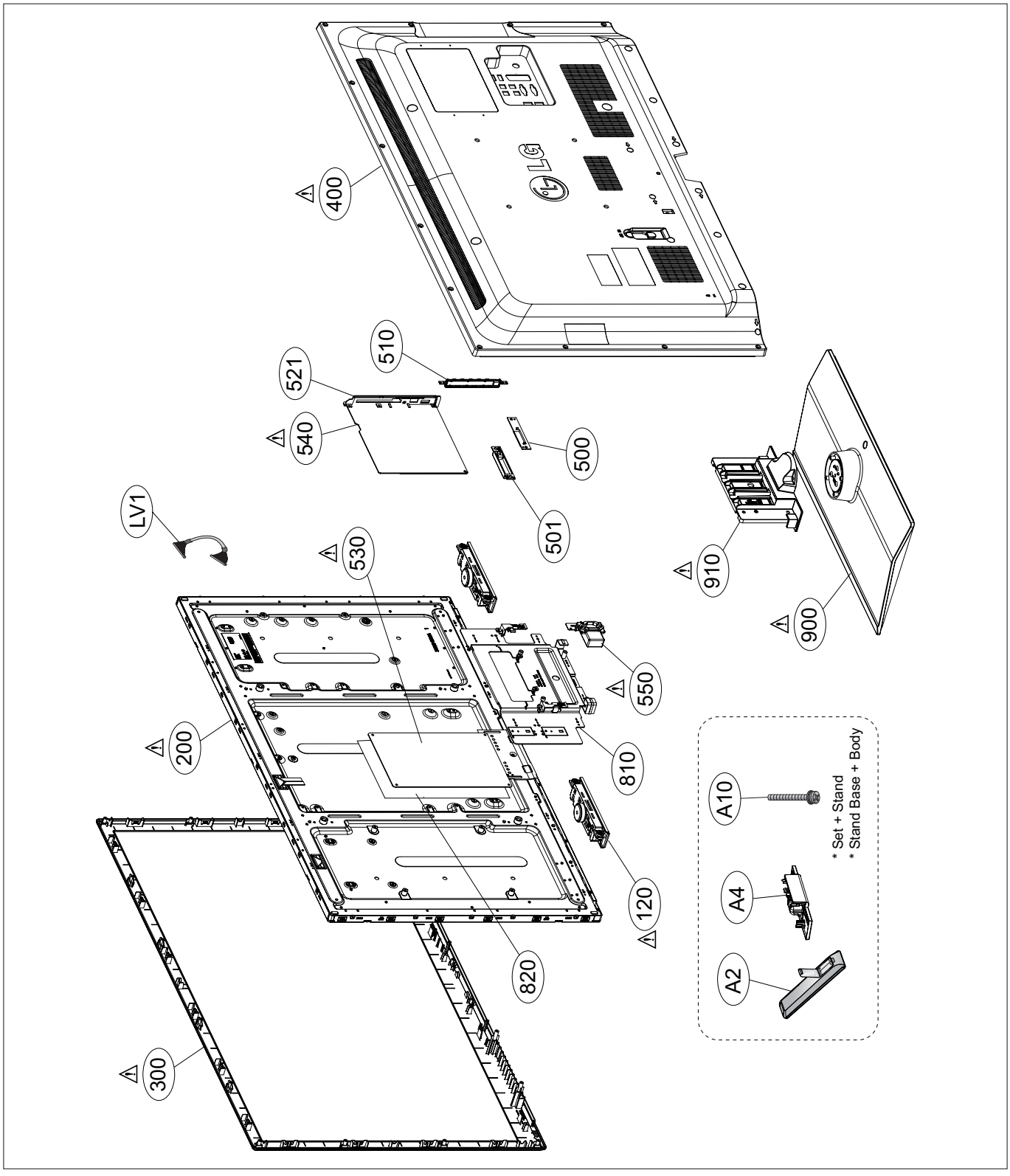
EXPLODED VIEW

IMPORTANT SAFETY NOTICE

Many electrical and mechanical parts in this chassis have special safety-related characteristics. These parts are identified by ⚠ in the Schematic Diagram and EXPLODED VIEW.
It is essential that these special safety parts should be replaced with the same components as recommended in this manual to prevent X-RADIATION, Shock, Fire, or other Hazards.
Do not modify the original design without permission of manufacturer.



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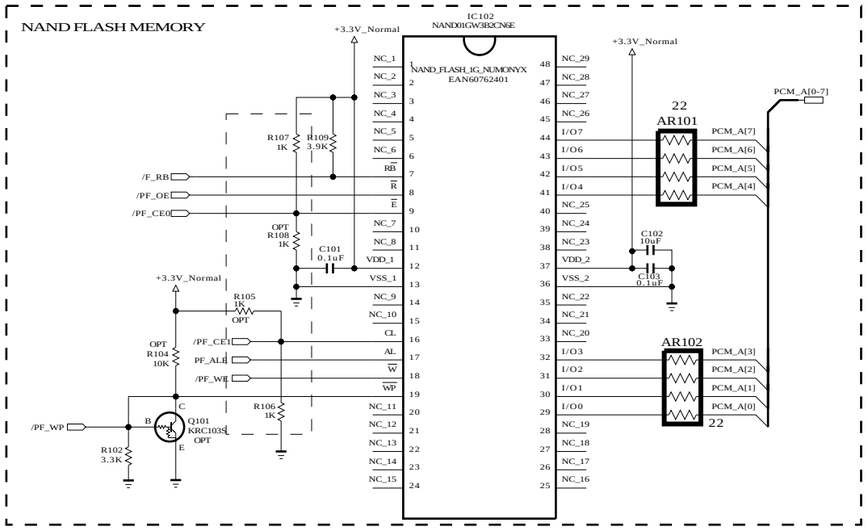
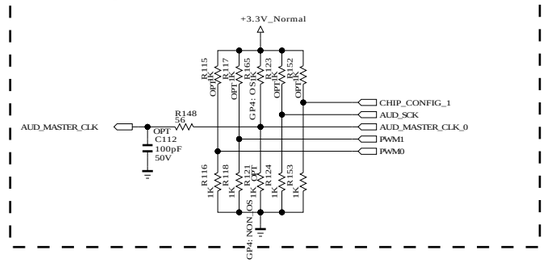
NAND FLASH MEMORY



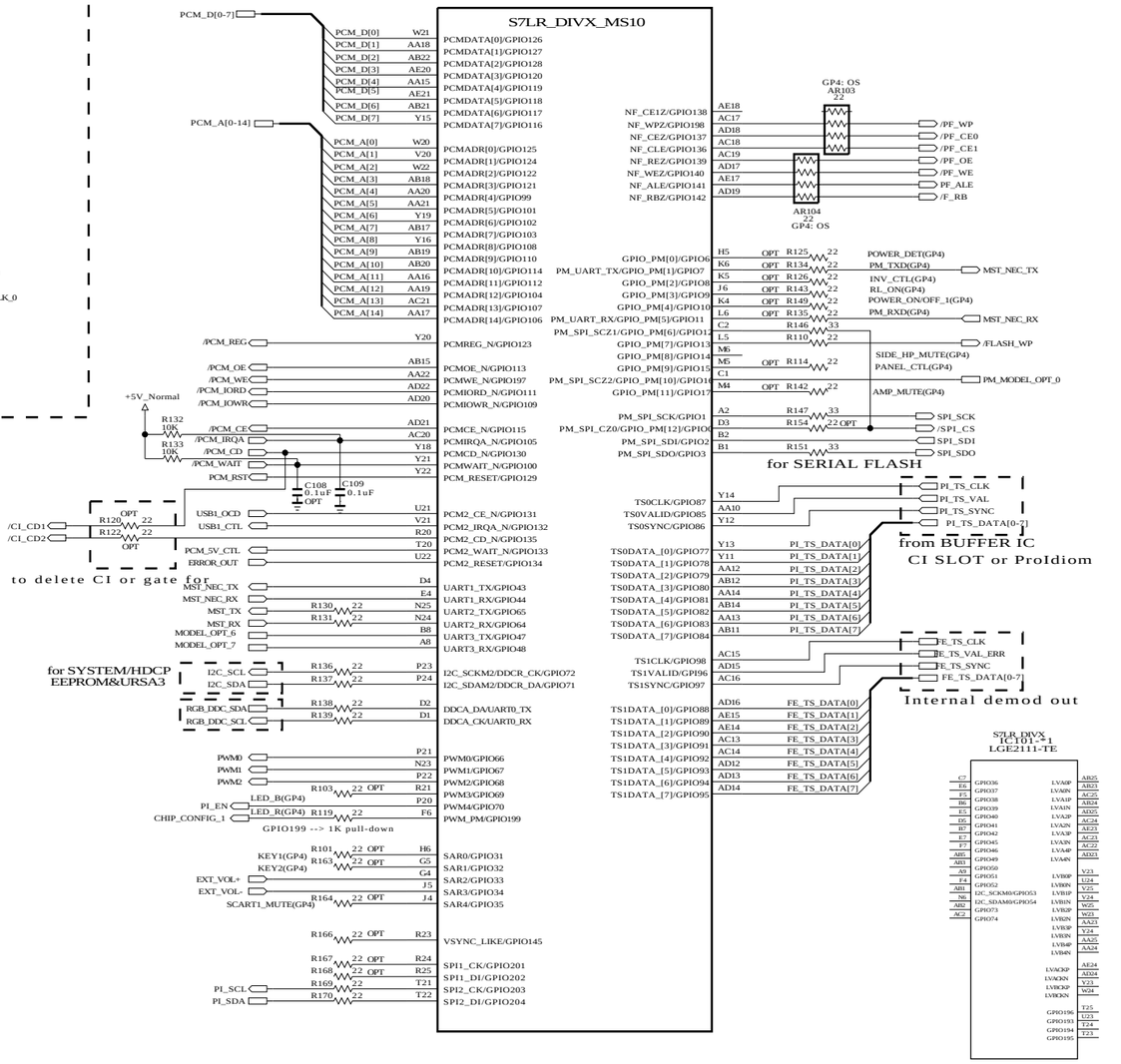
<CHIP Config1)>
Boot from SPI CS1N(EXT_FLASH) 1'b0
Boot from SPI_CS0N(INT_FLASH) 1'b1

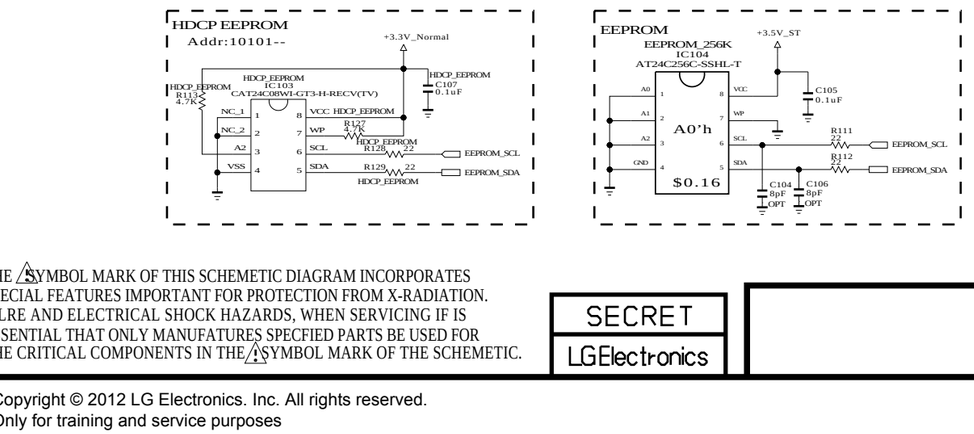
<CHIP Config>
(I2S_OUT_BCK,I2S_OUT_MCK,PAD_PWM1PAD_PWM0)

B51_no_EJ	: 4'b0000 Boot from 8051 with SPI flash
SB51_WOS	: 4'b0001 Secure B51 without scramble
SB51_WS	: 4'b0010 Secure B51 with scramble
MIPS_SPE_NO_EJ	: 4'b0100 Boot from MIPS with SPI flash
MIPS_SPI_EJ_1	: 4'b0101 Boot from MIPS with SPI flash
MIPS_SPI_EJ_2	: 4'b0110 Boot from MIPS with SPI flash
MIPS_WOS	: 4'b1001 Secure MIPS without scramble
MIPS_WS	: 4'b1010 Secure MIPS with SCRAMBLE



IC101
LGE2112-T8

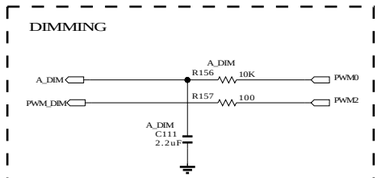



NAND_FLASH_1G_HYNIX
EAN35669102
IC102-*1
H27U1G8F2BTR-BC
NAND_FLASH_1G_SS
EAN61857001
IC102-*2
K9F1G08U0D-SCB0
NAND_FLASH_1G_TOSHIBA
EAN61508001
IC102-*3
TC58NVG0S3ETA0HBBH
NAND_FLASH_2G_HYNIX
EAN60708701
IC102-*4
HY27UF082G2B-TPCB
NC_1 NC_2 NC_3 NC_4 NC_5 NC_6 R/B RE CE NC_7 NC_8 VCC_1 VSS_1 NC_9 NC_10 CLE ALE WE WP NC_11 NC_12 NC_13 NC_14 NC_15
NC_29 NC_28 NC_27 NC_26 I/O7 I/O6 I/O5 I/O4 NC_25 NC_24 NC_23 VCC_2 VSS_2 NC_22 NC_21 NC_20 I/O3 I/O2 I/O1 I/O0 NC_19 NC_18 NC_17 NC_16
NC_1 NC_2 NC_3 NC_4 NC_5 NC_6 RY/BY RE CE NC_7 NC_8 VCC_1 VSS_1 NC_9 NC_10 CLE ALE WE WP NC_11 NC_12 NC_13 NC_14 NC_15
NC_29 NC_28 NC_27 NC_26 I/O8 I/O7 I/O6 I/O5 NC_25 NC_24 NC_23 VCC_2 VSS_2 NC_22 NC_21 I/O4 I/O3 I/O2 I/O1 NC_19 NC_18 NC_17 NC_16

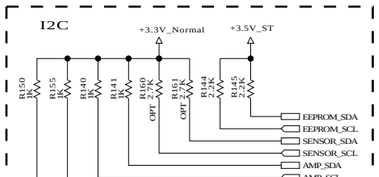
S7LR2_UO4_Divx/MS10
IC101-*2
LGE2111A-T8

GPIO36 GPIO37 GPIO38 GPIO39 GPIO40 GPIO41 GPIO42 GPIO45 GPIO46 GPIO49 GPIO50 GPIO51 GPIO52
I2C_SCKM0/GPIO53
I2C_SDAM0/GPIO54
GPIO73 GPIO74
LVA0P LVA0N LVA1P LVA1N LVA2P LVA2N LVA3P LVA3N LVA4P LVA4N
LVB0P LVB0N LVB1P LVB1N LVB2P LVB2N LVB3P LVB3N LVB4P LVB4N
LVACKP LVACKN LVBCKP LVBCKN
GPIO196 GPIO193 GPIO194 GPIO195

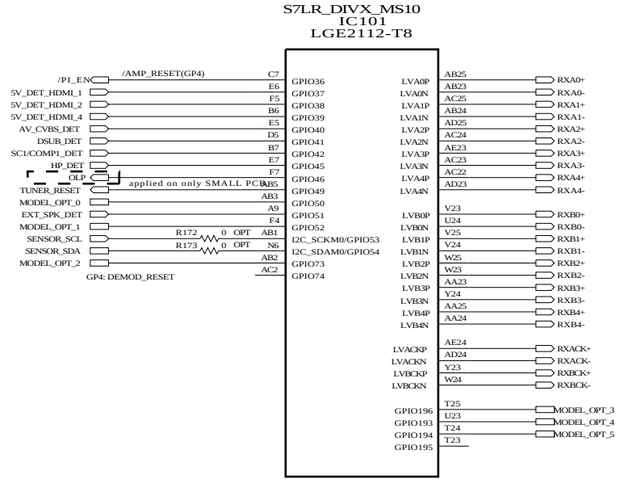
DIMMING



I2C



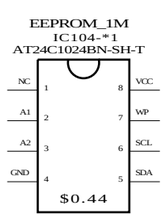
S7LR_DIVX_MS10
IC101
LGE2112-T8



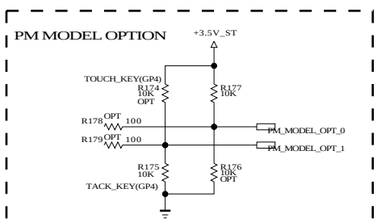
HDCP EEPROM

EEPROM

EEPROM_1M



PM MODEL OPTION



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EMEA INTERACTIVE

MODEL	GP4_MSTAR	DATE	2011.08.21
BLOCK	FLASH/EEPROM/GPIO	SHEET	1 / 20

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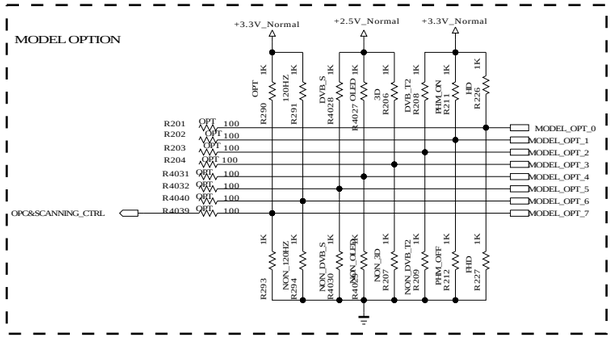
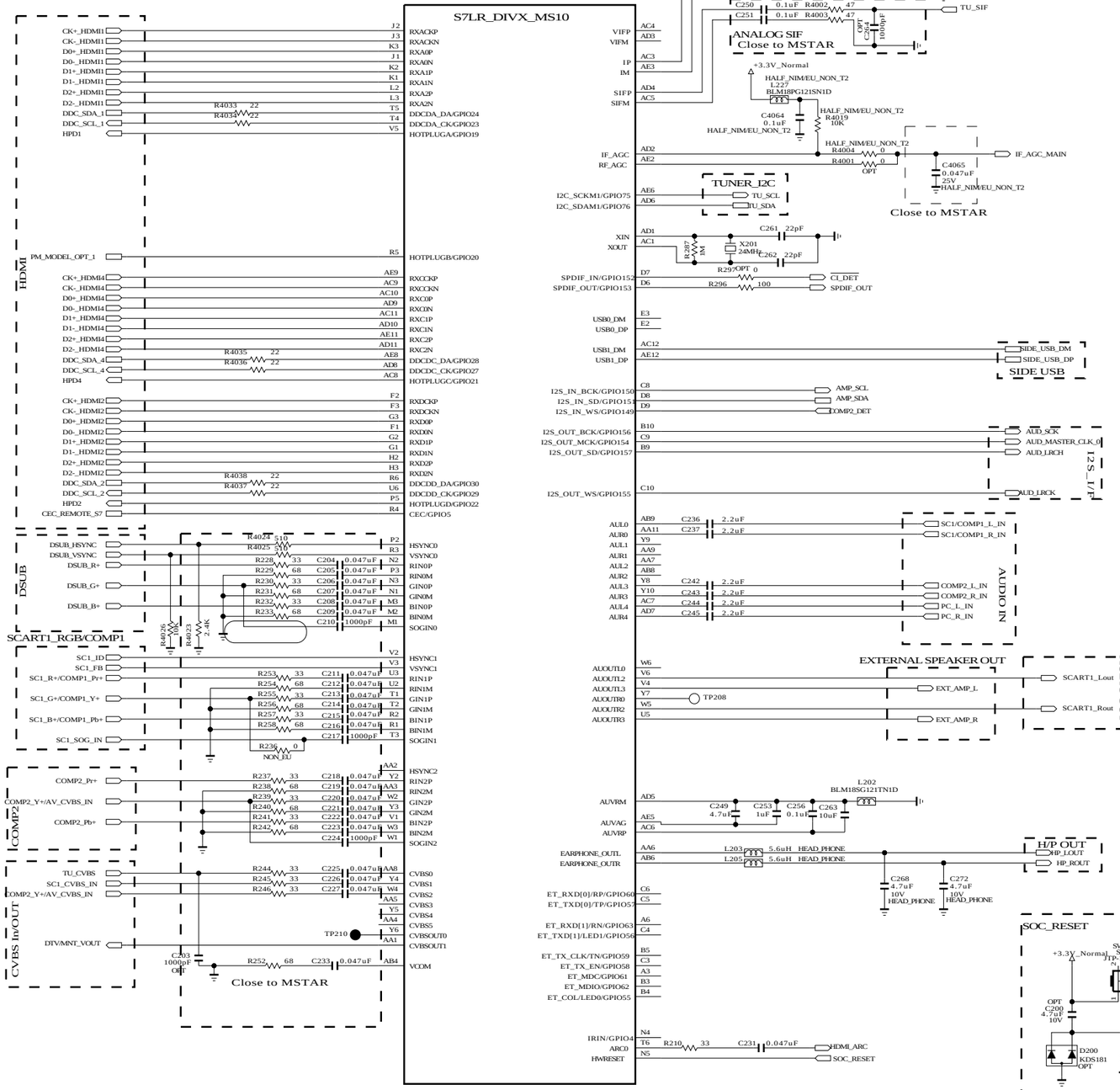
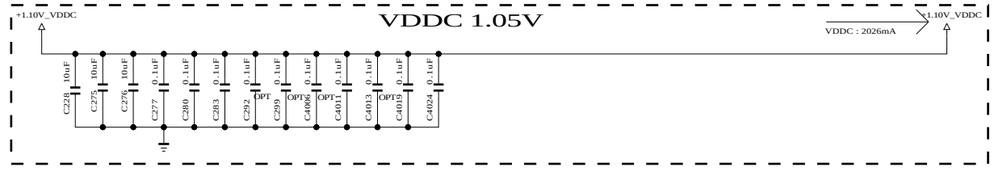
MODEL OPTION

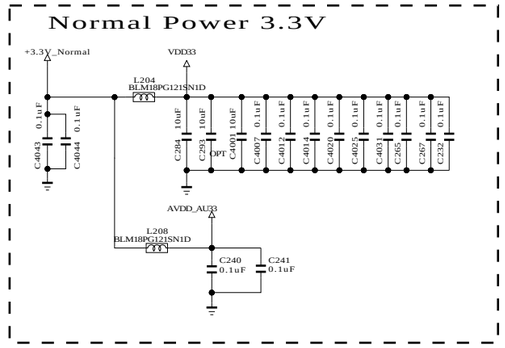
PIN NAME	PIN NO.	LOW	HIGH
MODEL_OPT_0	AB3	FHD	HD
MODEL_OPT_1	F4	PHM_OFF	PHM_ON
MODEL_OPT_2	AB2	NON_DVB_T2	DVB_T2
MODEL_OPT_3	T25	NON_3D	3D
MODEL_OPT_4	U23	NON_OLED	OLED
MODEL_OPT_5	T24	NON_DVB_S	DVB_S
MODEL_OPT_6	B8	NON_120HZ	120HZ
MODEL_OPT_7	A8	OS:NON_DualStream NonOS:ErrorOut	OS:DualStream NonOS:NON_ErrorOut

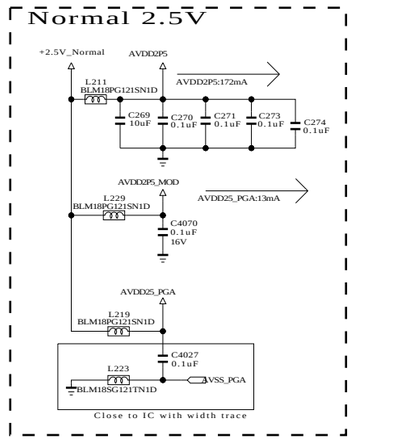
* Dual Stream is only Korea 3D spec

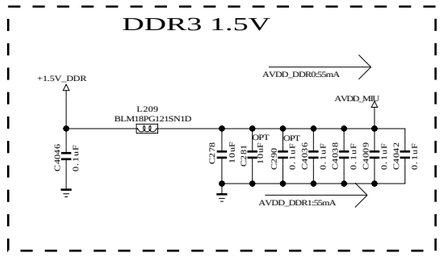


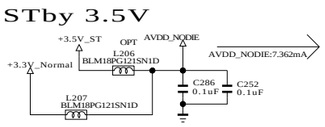


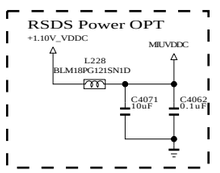


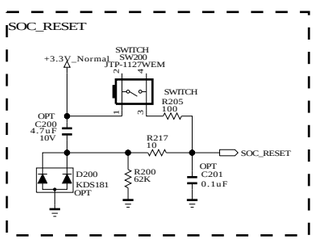


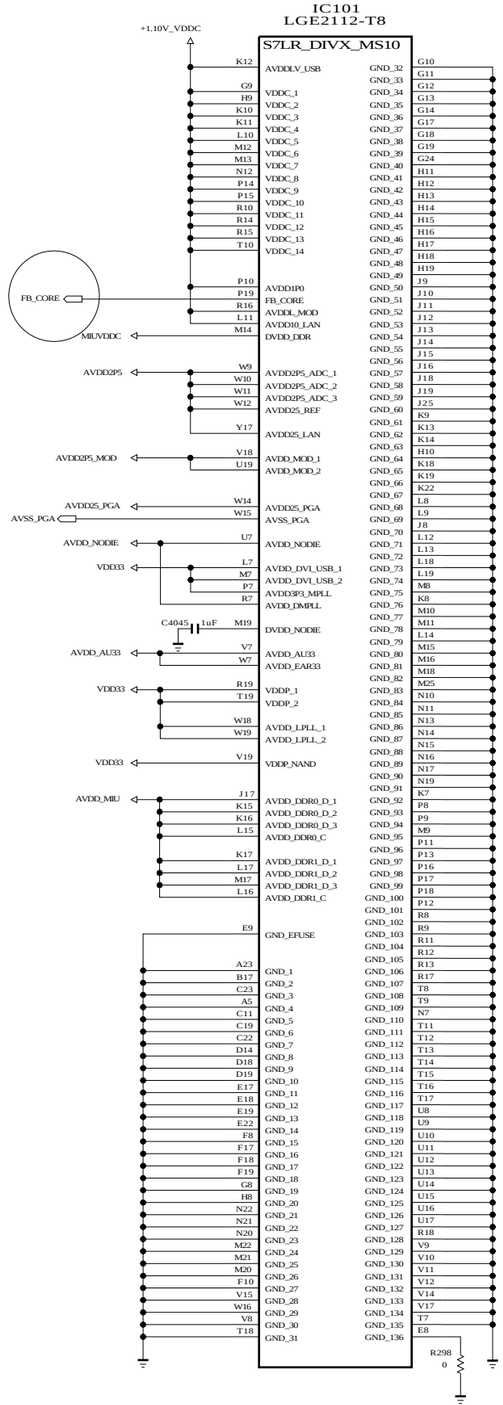












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EMEA INTERACTIVE

MODEL	GP4_MSTAR	DATE	2011.08.21
BLOCK	MAIN2, HW OPT	SHEET	2 / 20

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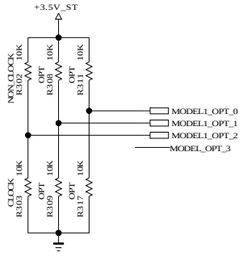
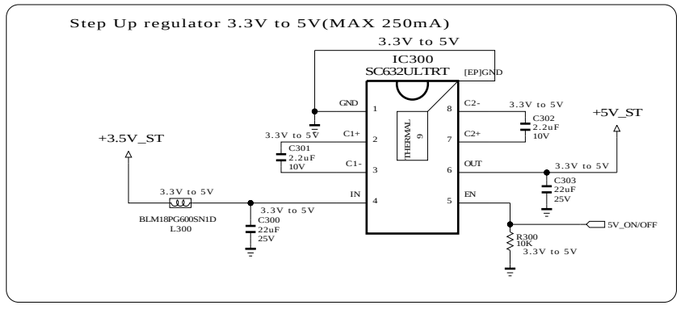
MICOM MODEL OPTION

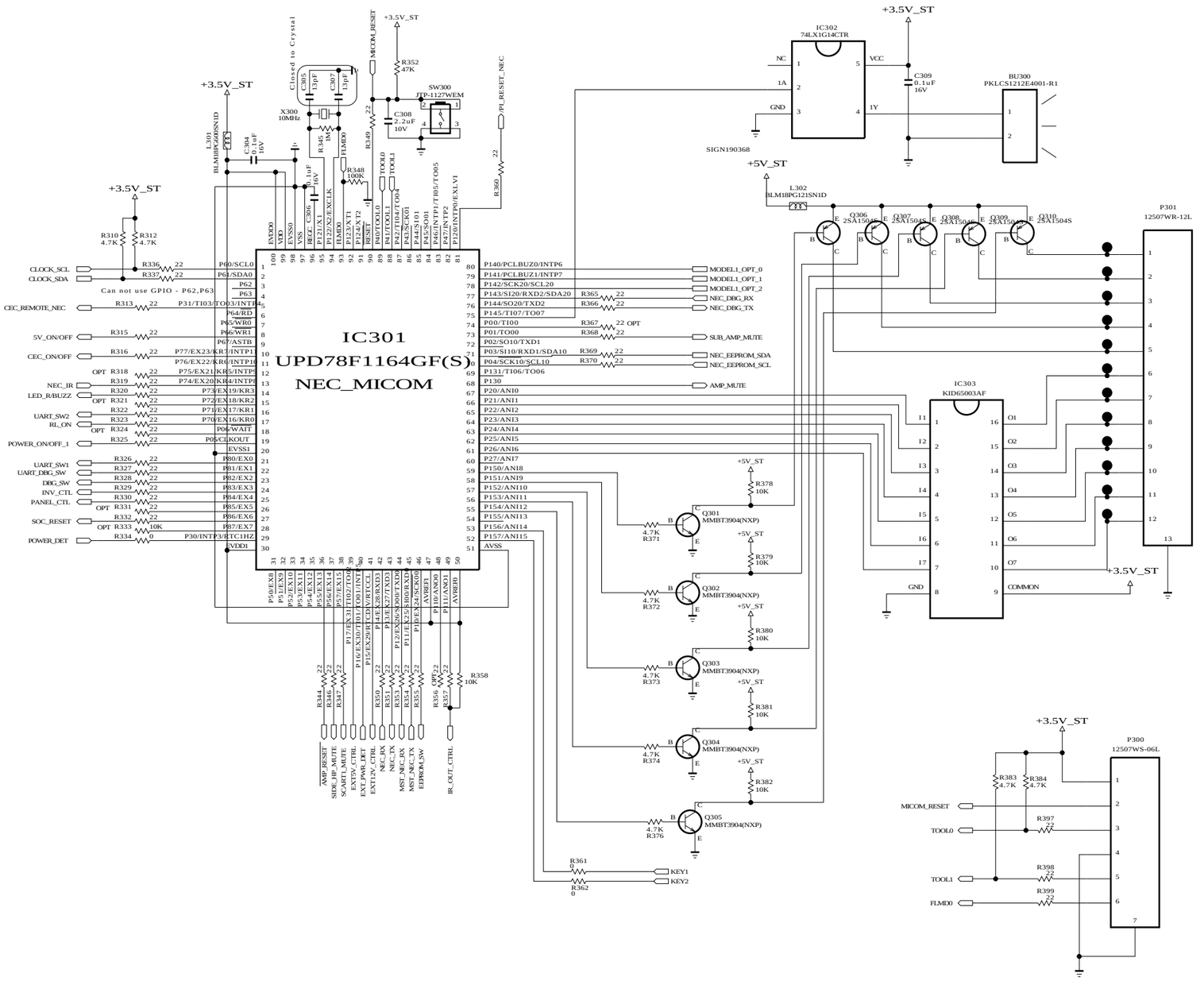


MODEL OPTION

PIN NAME	PIN NO.	HIGH	LOW
MODEL_OPT_0	80	OPT	OPT
MODEL_OPT_1	79	OPT	OPT
MODEL_OPT_2	78	NON_CLOCK	CLOCK

Step Up regulator 3.3V to 5V(MAX 250mA)





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EMEA INTERACTIVE

MODEL	GP4_MSTAR	DATE	2011.08.21
BLOCK	SUB MICOM	SHEET	3 / 20

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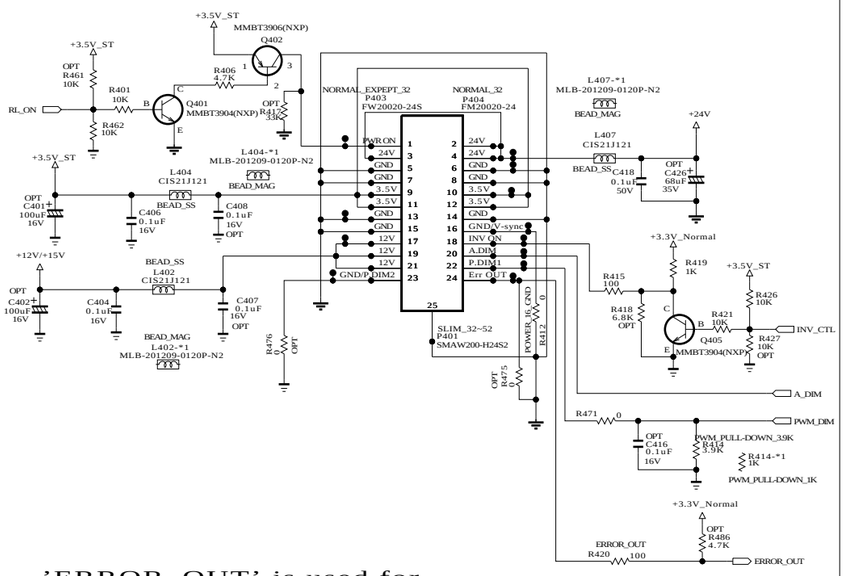
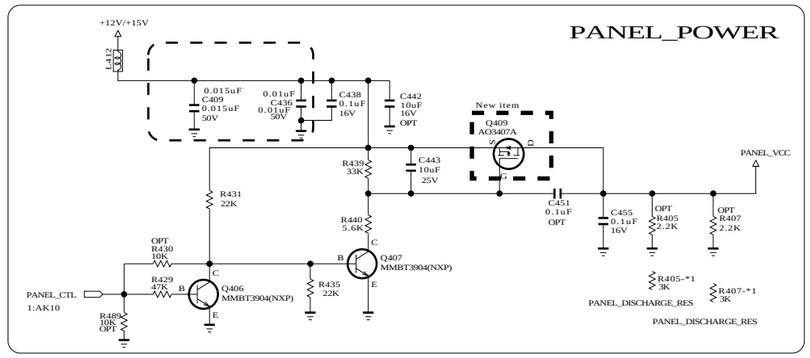
FROM LIPS & POWER B/D

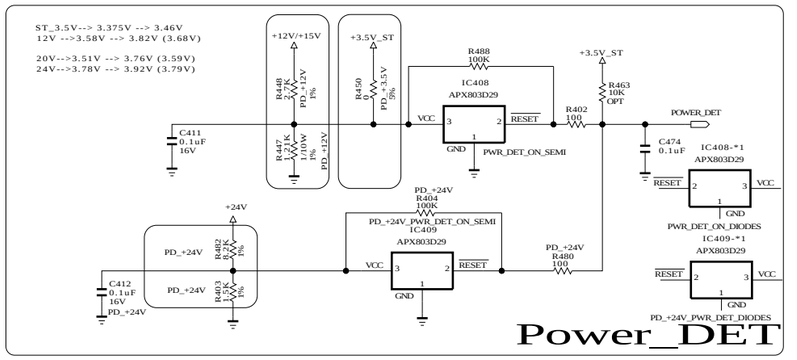


'ERROR_OUT' is used for
lamp(CCFL/EEFL) models.
In other words,
LED models need not use.

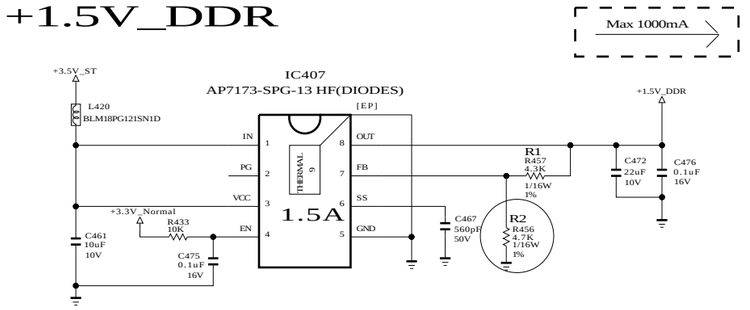
PANEL_POWER



Power_DET

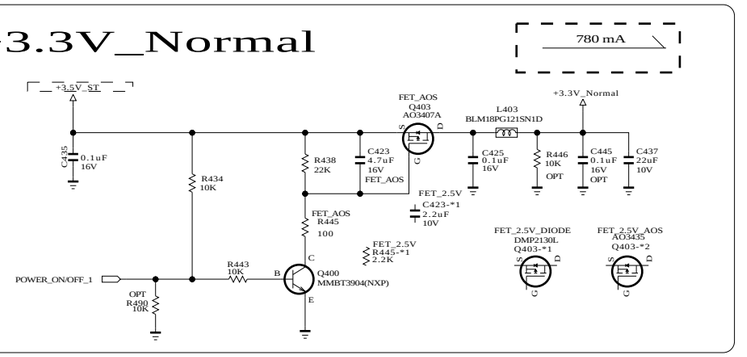


+1.5V_DDR

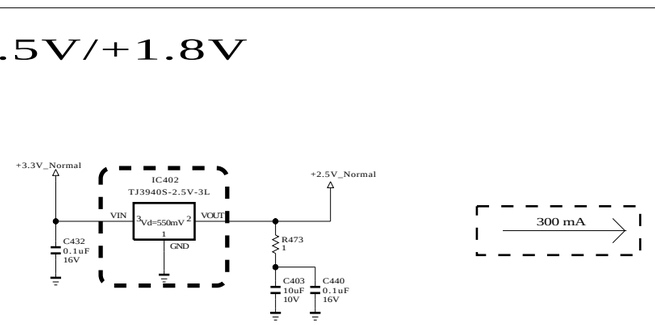


Vout=0.8*(1+R1/R2)=1.5319

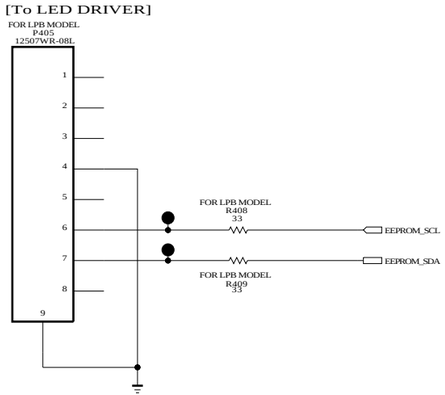
+3.3V_Normal



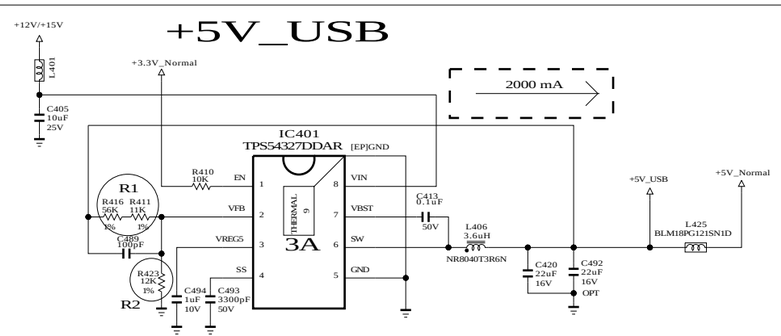
+2.5V/+1.8V



FOR LPB Download

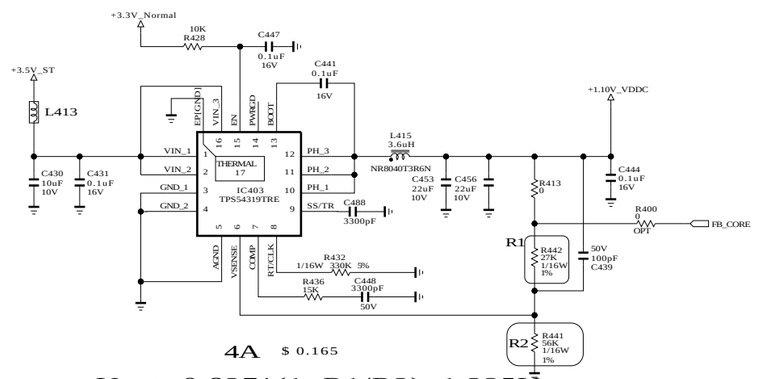


+5V_USB



Vout=(1+R1/R2)*0.765=5.03V

S7LR core 1.2V volt



Vout=0.827*(1+R1/R2)=1.225V

OLP

Not used :
only for small(ready)

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EMEA INTERACTIVE

MODEL	GP4_MSTAR	DATE	2011.08.21
BLOCK	POWER_LARGE	SHEET	4 / 20

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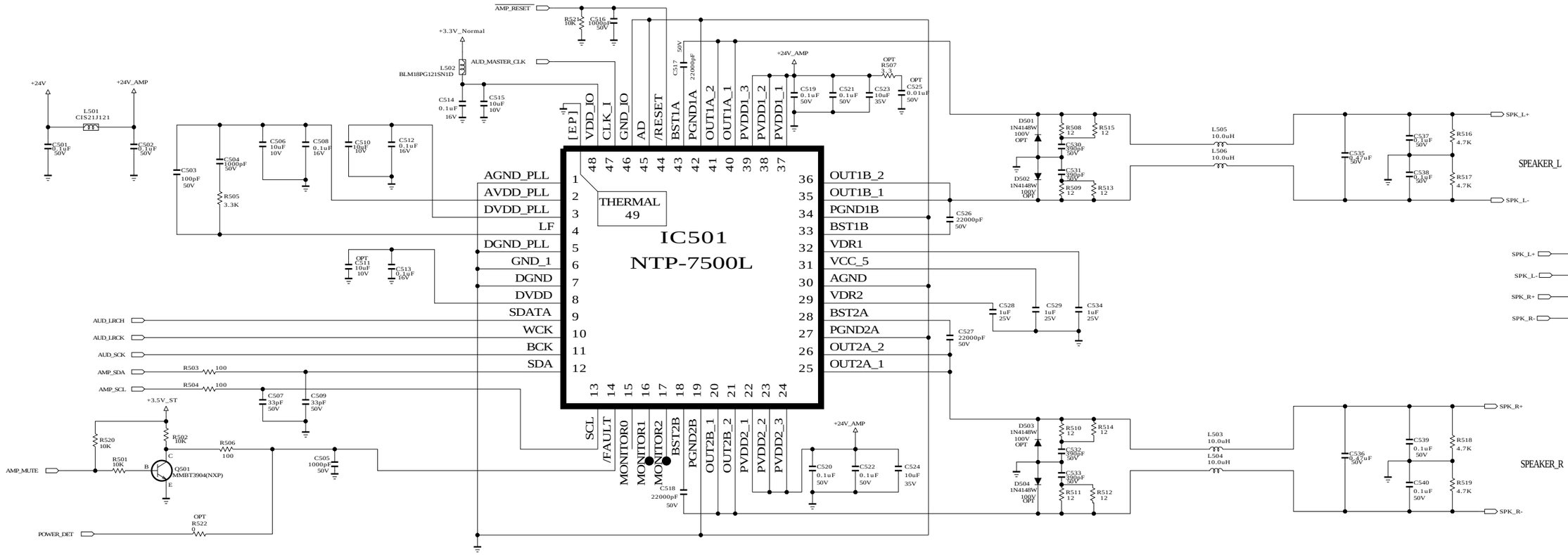

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EMEA INTERACTIVE

MODEL	GP4_MSTAR	DATE	2011.08.21
BLOCK	AUDIO AMP	SHEET	2 / 20

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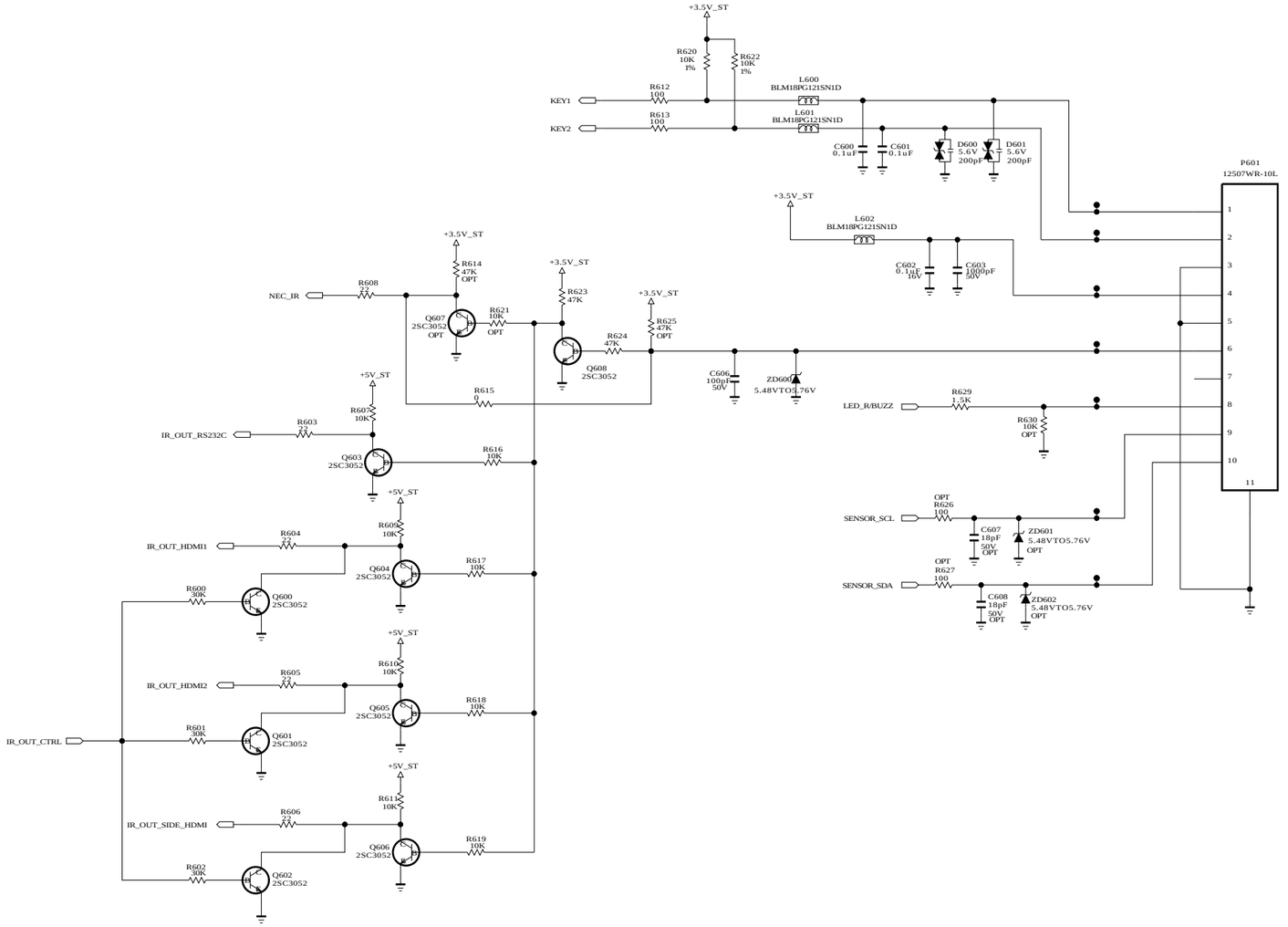
CONTROL
IR & LED



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EMEA INTERACTIVE

MODEL	GP4_MSTAR	DATE	2011.08.21
BLOCK	IR/CONTROL	SHEET	6 / 20

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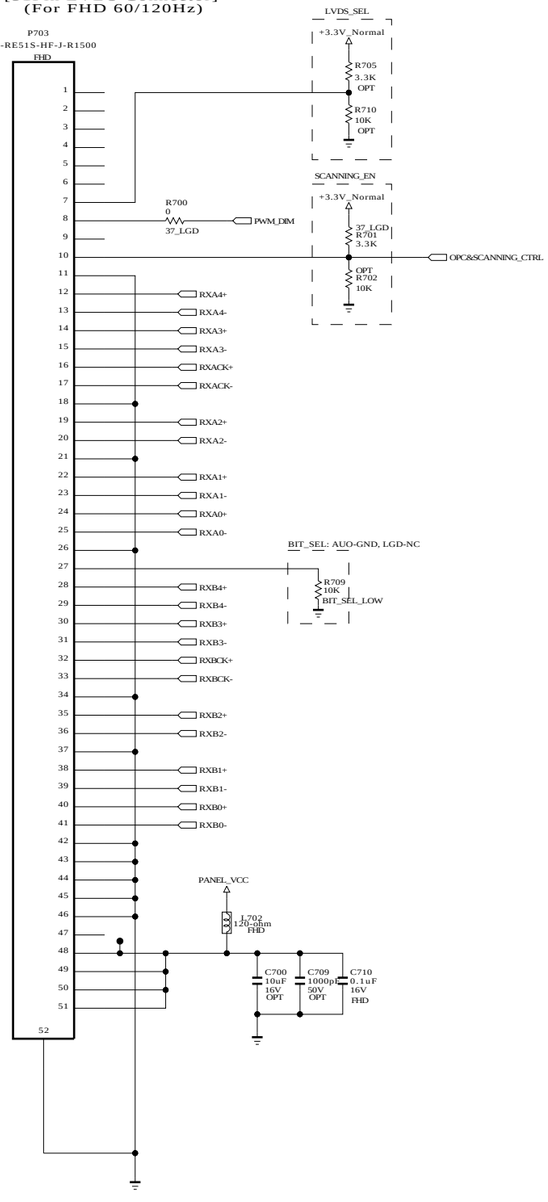
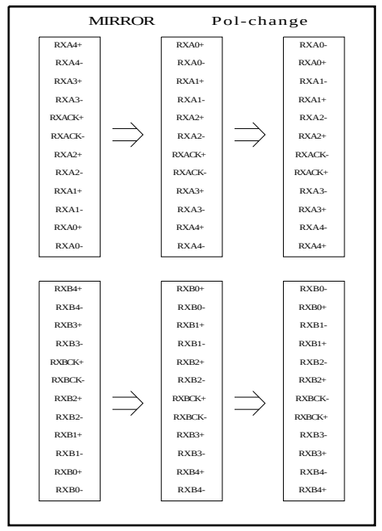
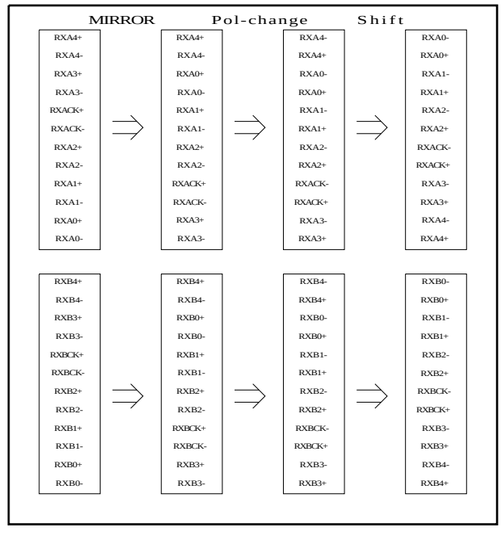
[51Pin LVDS Connector] (For FHD 60/120Hz)



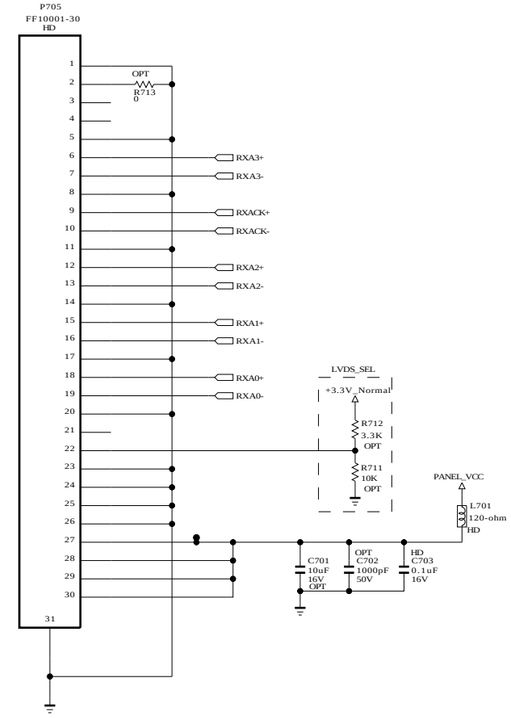
FOR FHD REVERSE(10bit)
Change in S7LR


MIRROR
Pol-change
RXA4+ RXA4- RXA3+ RXA3- RXACK+ RXACK- RXA2+ RXA2- RXA1+ RXA1- RXA0+ RXA0-
RXA0+ RXA0- RXA1+ RXA1- RXA2+ RXA2- RXACK+ RXACK- RXA3+ RXA3- RXA4+ RXA4-
RXA0- RXA0+ RXA1- RXA1+ RXA2- RXA2+ RXACK- RXACK+ RXA3- RXA3+ RXA4- RXA4+
RXB4+ RXB4- RXB3+ RXB3- RXBCK+ RXBCK- RXB2+ RXB2- RXB1+ RXB1- RXB0+ RXB0-
RXB0+ RXB0- RXB1+ RXB1- RXB2+ RXB2- RXBCK+ RXBCK- RXB3+ RXB3- RXB4+ RXB4-
RXB0- RXB0+ RXB1- RXB1+ RXB2- RXB2+ RXBCK- RXBCK+ RXB3- RXB3+ RXB4- RXB4+

FOR FHD REVERSE(8bit)
Change in S7LR


MIRROR
Pol-change
Shift
RXA4+ RXA4- RXA3+ RXA3- RXACK+ RXACK- RXA2+ RXA2- RXA1+ RXA1- RXA0+ RXA0-
RXA4+ RXA4- RXA0+ RXA0- RXA1+ RXA1- RXA2+ RXA2- RXACK+ RXACK- RXA3+ RXA3-
RXA4- RXA4+ RXA0- RXA0+ RXA1- RXA1+ RXA2- RXA2+ RXACK- RXACK+ RXA3- RXA3+
RXA0- RXA0+ RXA1- RXA1+ RXA2- RXA2+ RXACK- RXACK+ RXA3- RXA3+ RXA4- RXA4+
RXB4+ RXB4- RXB3+ RXB3- RXBCK+ RXBCK- RXB2+ RXB2- RXB1+ RXB1- RXB0+ RXB0-
RXB4+ RXB4- RXB0+ RXB0- RXB1+ RXB1- RXB2+ RXB2- RXBCK+ RXBCK- RXB3+ RXB3-
RXB4- RXB4+ RXB0- RXB0+ RXB1- RXB1+ RXB2- RXB2+ RXBCK- RXBCK+ RXB3- RXB3+
RXB0- RXB0+ RXB1- RXB1+ RXB2- RXB2+ RXBCK- RXBCK+ RXB3- RXB3+ RXB4- RXB4+

[30Pin LVDS Connector] (For HD 60Hz_Normal)



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EMEA INTERACTIVE

MODEL	GP4_MSTAR	DATE	2011.08.21
BLOCK	LVDS WAFER	SHEET	7 / 20

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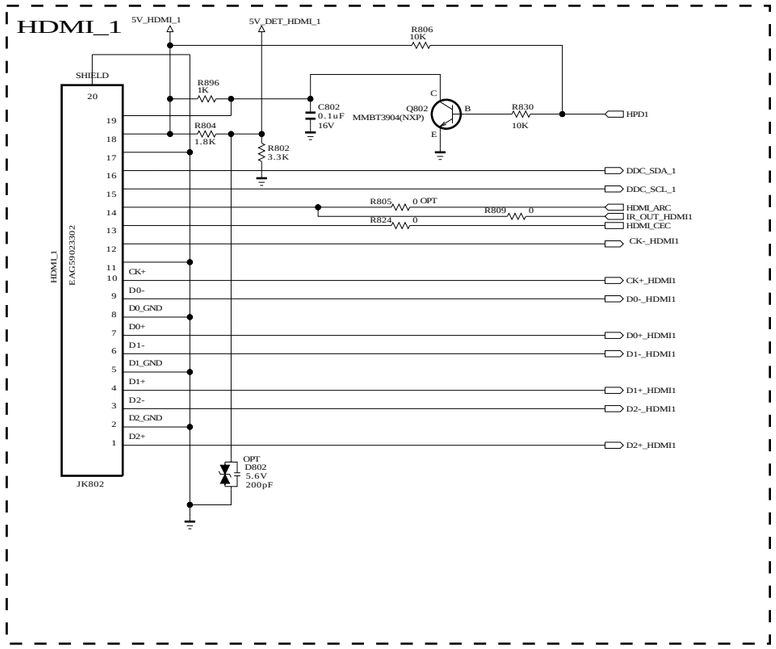
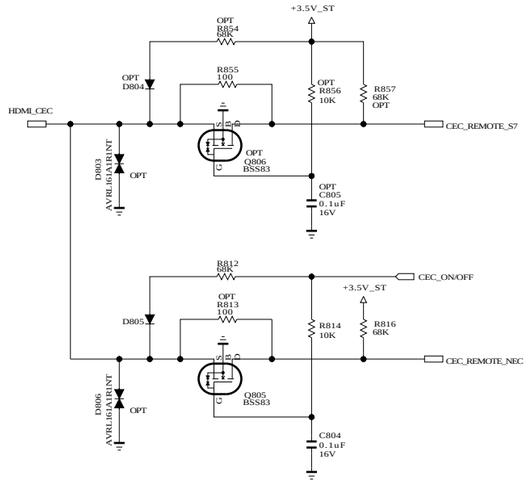
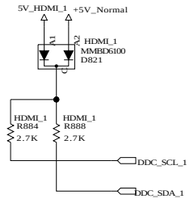
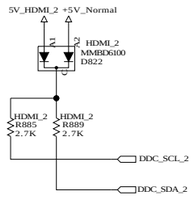
HDMI_1

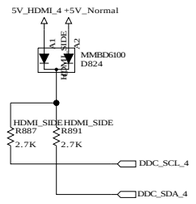


For CEC

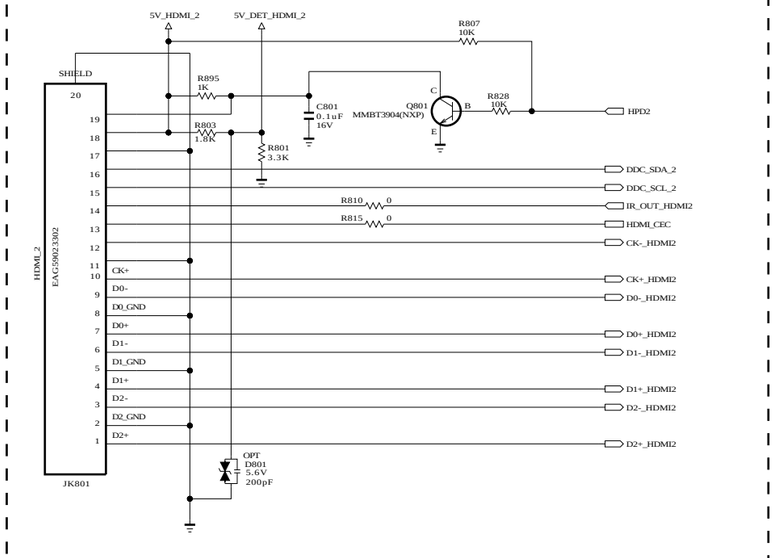




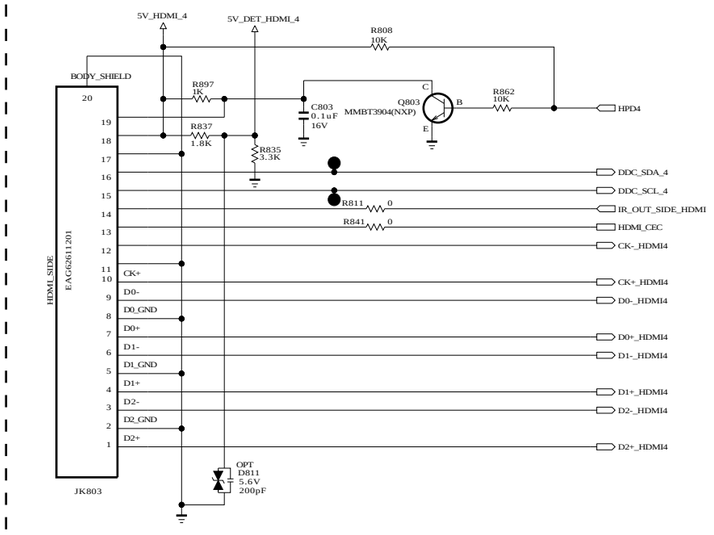




HDMI_2



SIDE_HDMI



THE ⚠ SYMBOL MARK OF THIS SCHEMETIC DIAGRAM INCORPORATES SPECIAL FEATURES IMPORTANT FOR PROTECTION FROM X-RADIATION. FILRE AND ELECTRICAL SHOCK HAZARDS, WHEN SERVICING IF IS ESSENTIAL THAT ONLY MANUFATURES SPECFIED PARTS BE USED FOR THE CRITICAL COMPONENTS IN THE ⚠ SYMBOL MARK OF THE SCHEMETIC.

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EMEA INTERACTIVE

MODEL	GP4_MSTAR	DATE	2011.08.21
BLOCK	HDMI	SHEET	8 / 20

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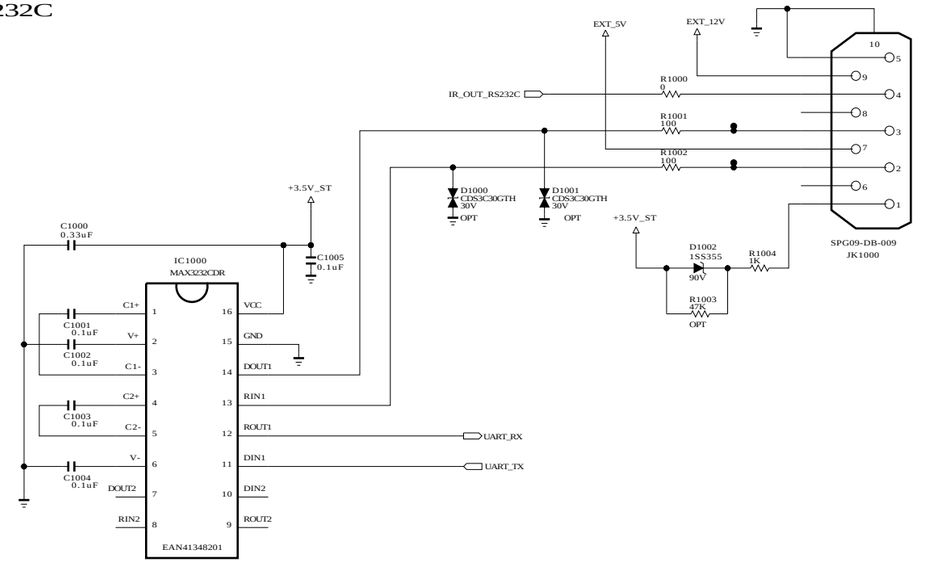
RS232C



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BLOCK	RS232C_9PIN	SHEET	10 / 20

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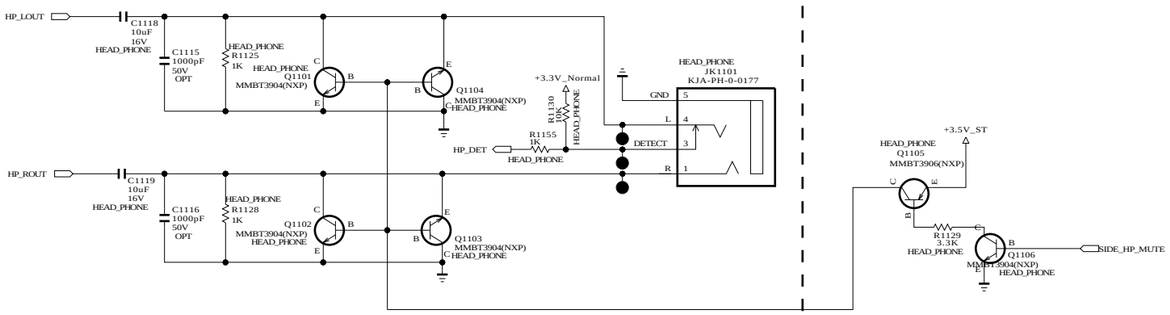
RGB/SPDIF/PC/HP/USB

EARPHONE BLOCK



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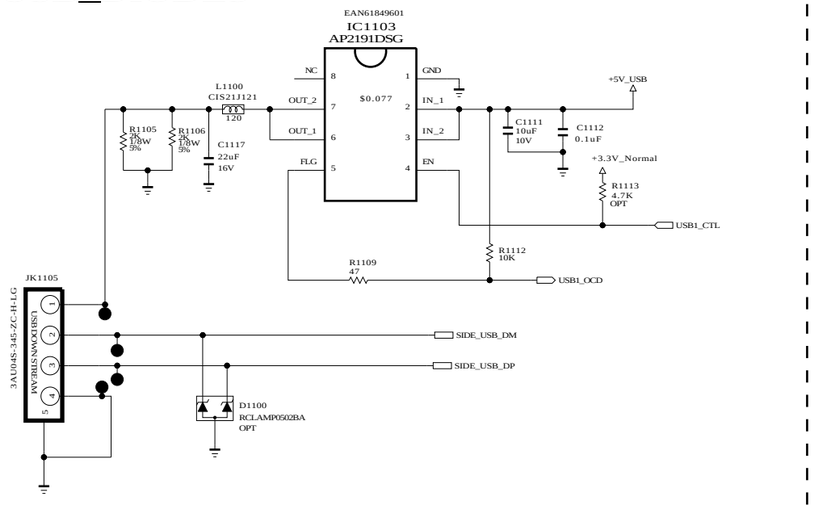
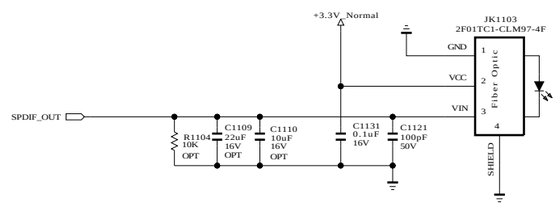


SPDIF OPTIC JACK

5.15 Mstar Circuit Application



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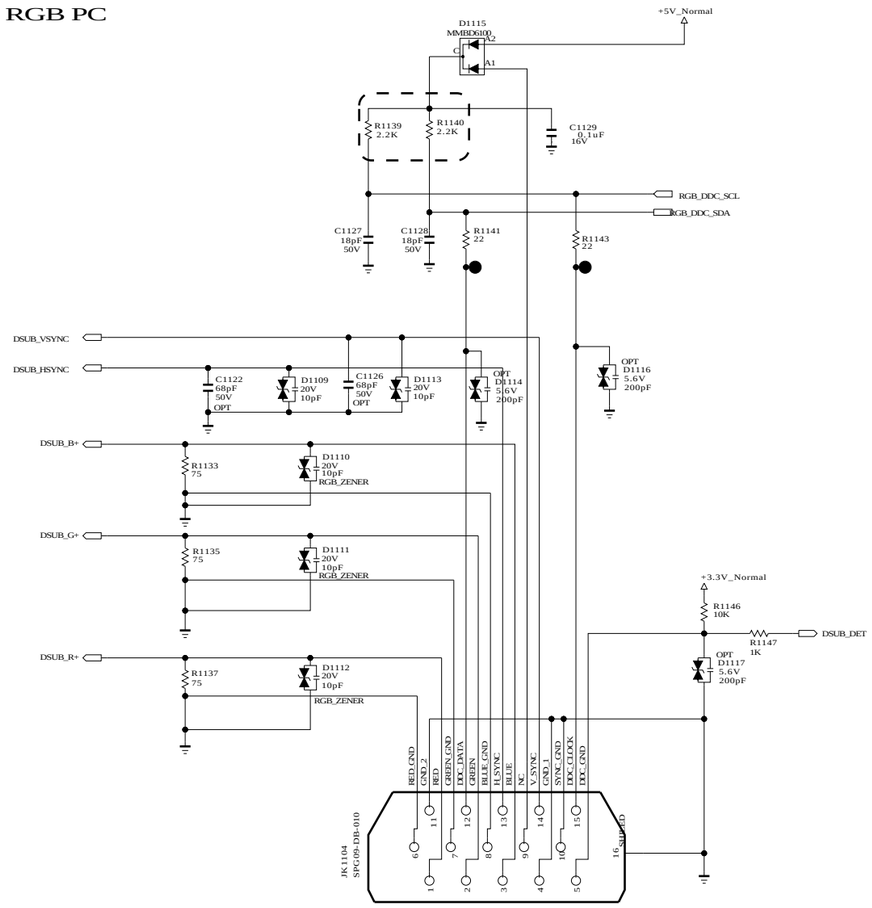
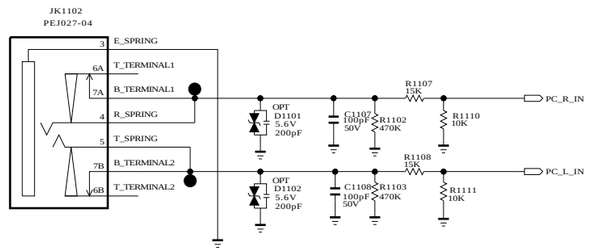


PC AUDIO



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MODEL	GP4_MSTAR	DATE	2011.08.21
BLOCK	INTERFACE	SHEET	11 / 20

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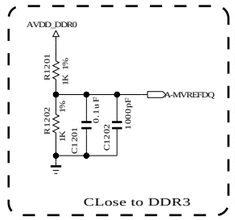

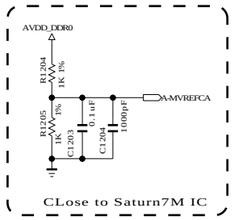

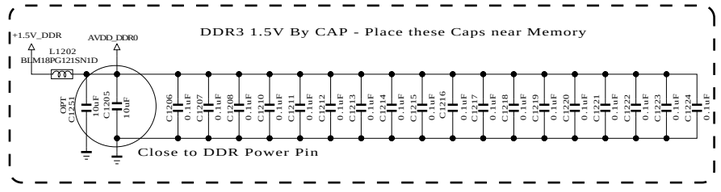

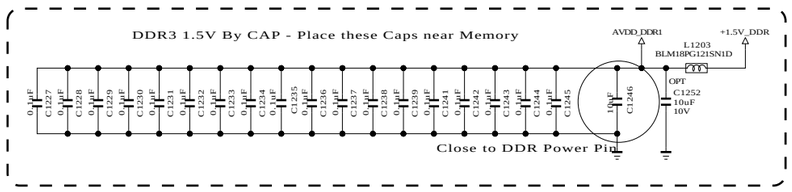

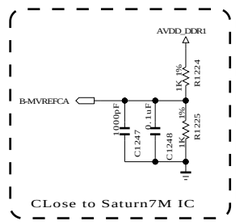

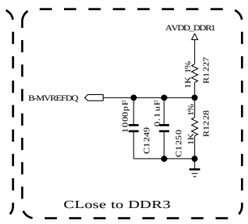

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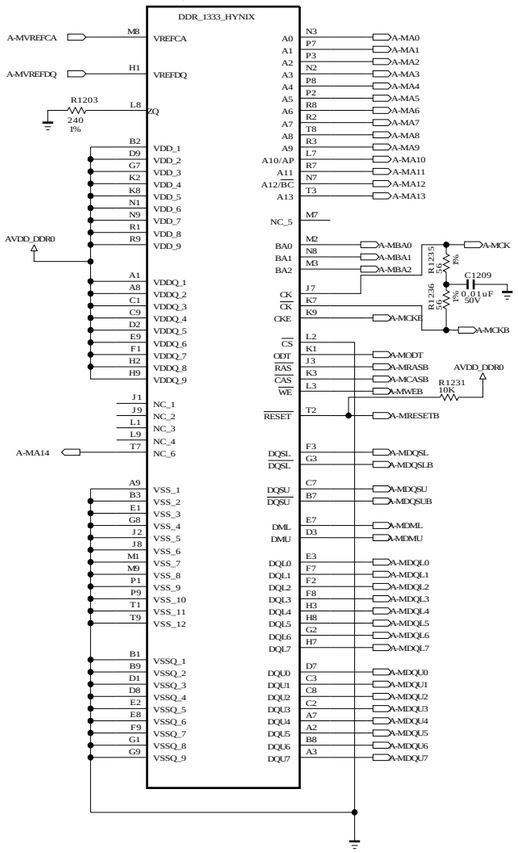

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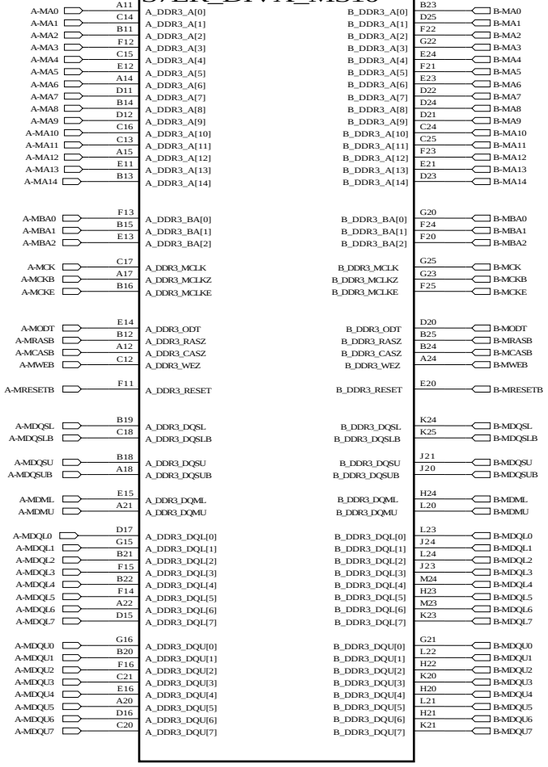
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A-MBA0 A-MBA1 A-MBA2
A_DDR3_BA[0] A_DDR3_BA[1] A_DDR3_BA[2]
A-MCK A-MCKB A-MCKE
A_DDR3_MCLK A_DDR3_MCLKZ A_DDR3_MCLKE
A-MODT A-MRASB A-MCASB A-MWEB
A_DDR3_ODT A_DDR3_RASZ A_DDR3_CASZ A_DDR3_WEZ
A-MRESETB
A_DDR3_RESET
A-MDQSL A-MDQSLB
A_DDR3_DQSL A_DDR3_DQSLB
A-MDQSU A-MDQSUB
A_DDR3_DQSU A_DDR3_DQSUB
A-MDML A-MDMU
A_DDR3_DQML A_DDR3_DQMU
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B-MA0 B-MA1 B-MA2 B-MA3 B-MA4 B-MA5 B-MA6 B-MA7 B-MA8 B-MA9 B-MA10 B-MA11 B-MA12 B-MA13 B-MA14
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B-MCK B-MCKB B-MCKE
B_DDR3_ODT B_DDR3_RASZ B_DDR3_CASZ B_DDR3_WEZ
B-MODT B-MRASB B-MCASB B-MWEB
B_DDR3_RESET
B-MRESETB
B_DDR3_DQSL B_DDR3_DQSLB
B-MDQSL B-MDQSLB
B_DDR3_DQSU B_DDR3_DQSUB
B-MDQSU B-MDQSUB
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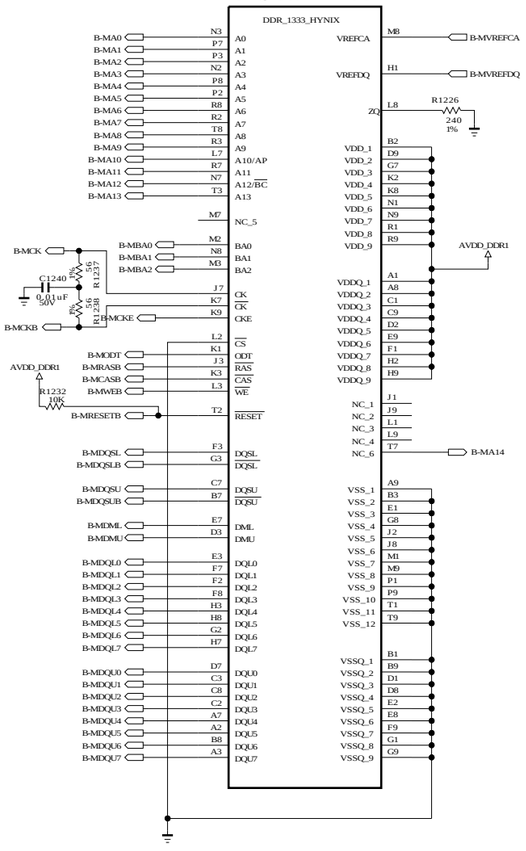

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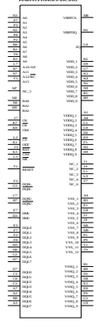

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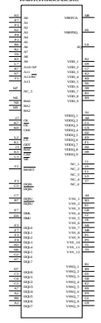

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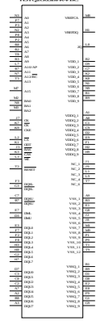

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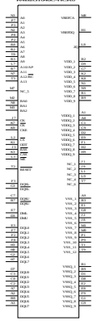

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MODEL	GP4_MSTAR	DATE	2011.08.21
BLOCK	DDR	SHEET	12 / 20

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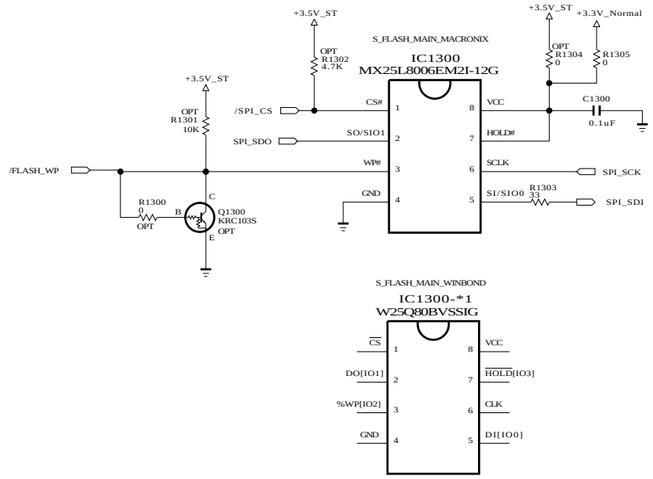

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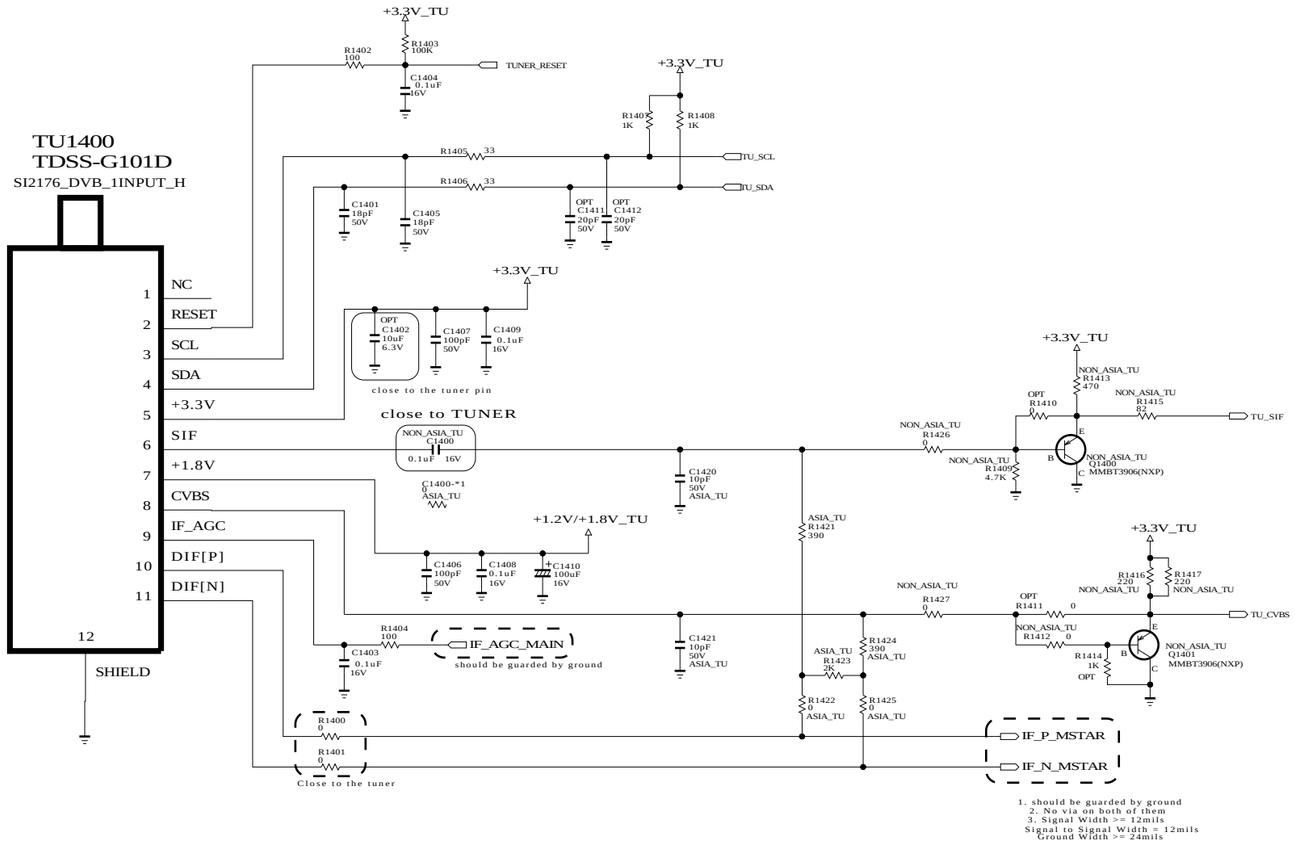
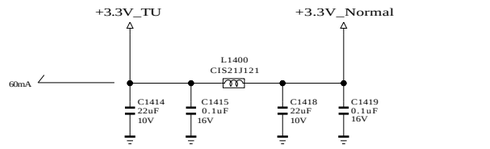
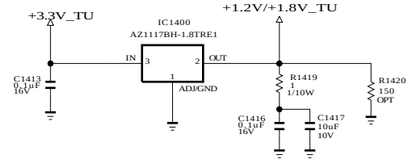
P4R_GLOBAL_TUNER_BLOCK







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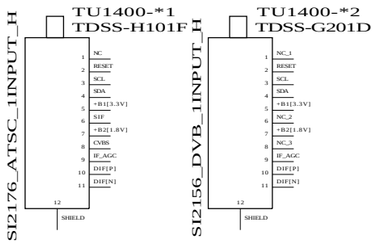

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BLOCK	TUNER	SHEET	14 / 20

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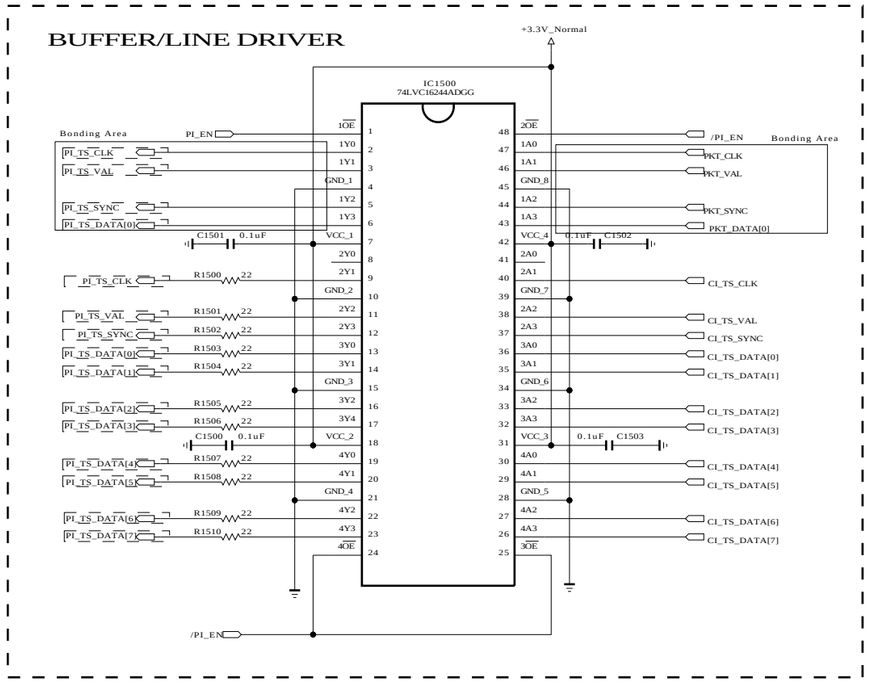

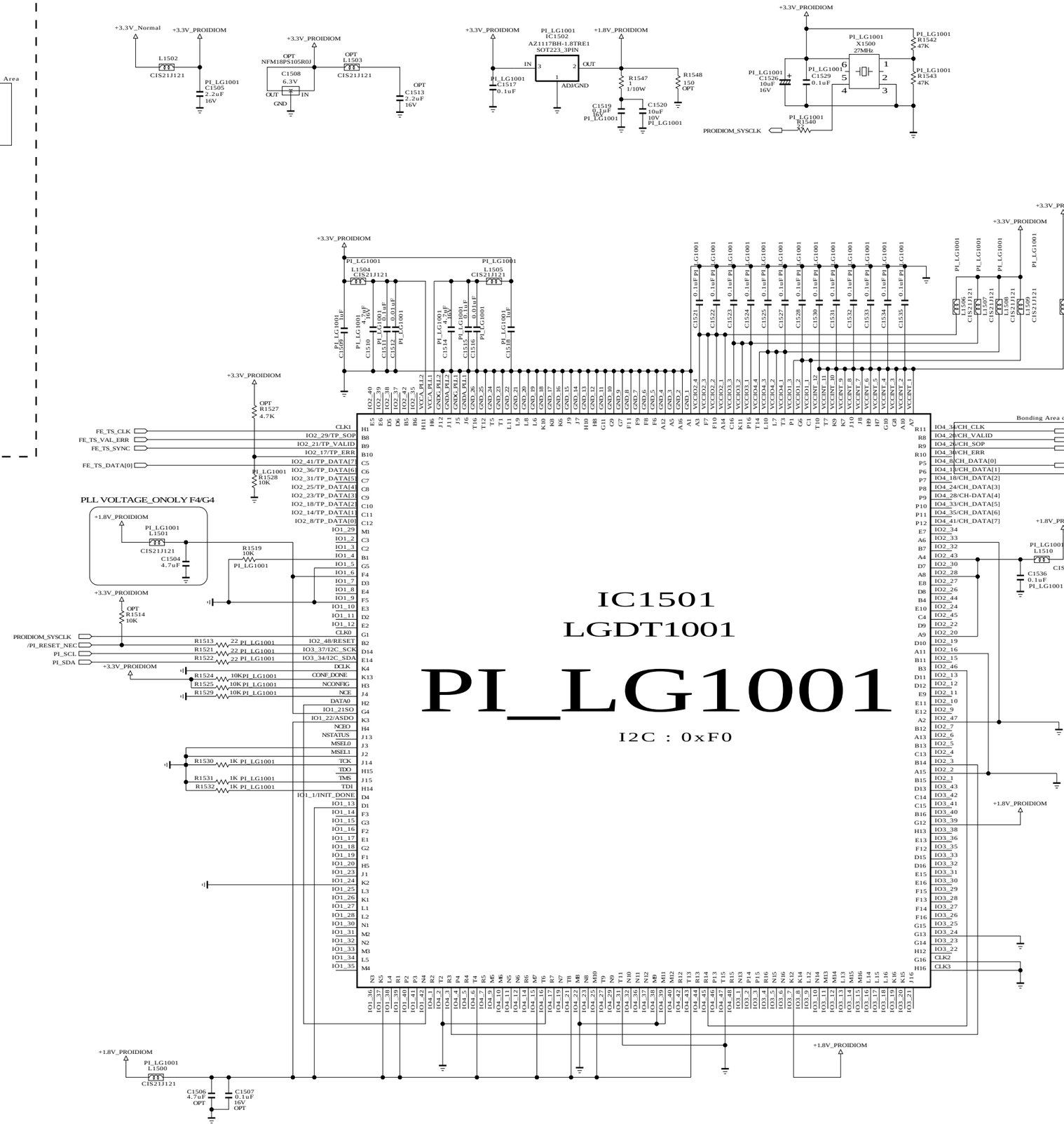

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MODEL	GP4_MSTAR	DATE	2011.08.21
BLOCK	Pro:Idiom	SHEET	15 / 20

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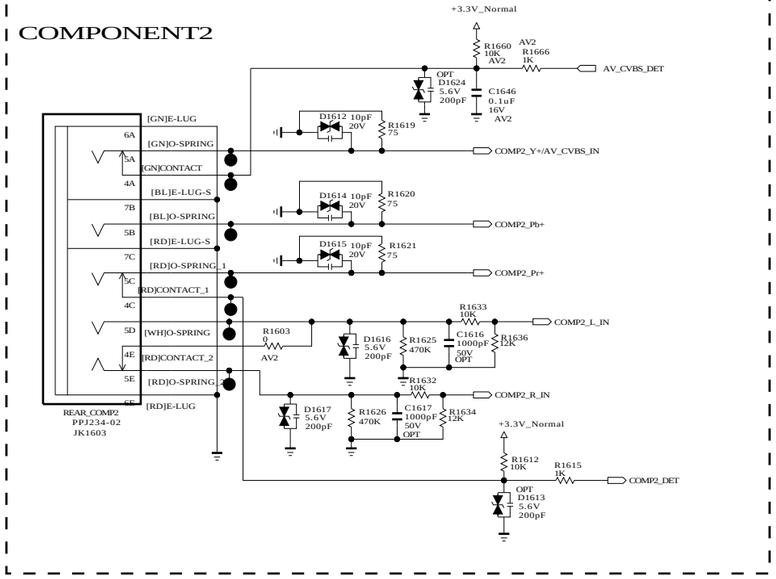
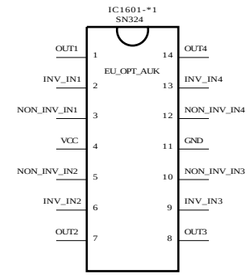
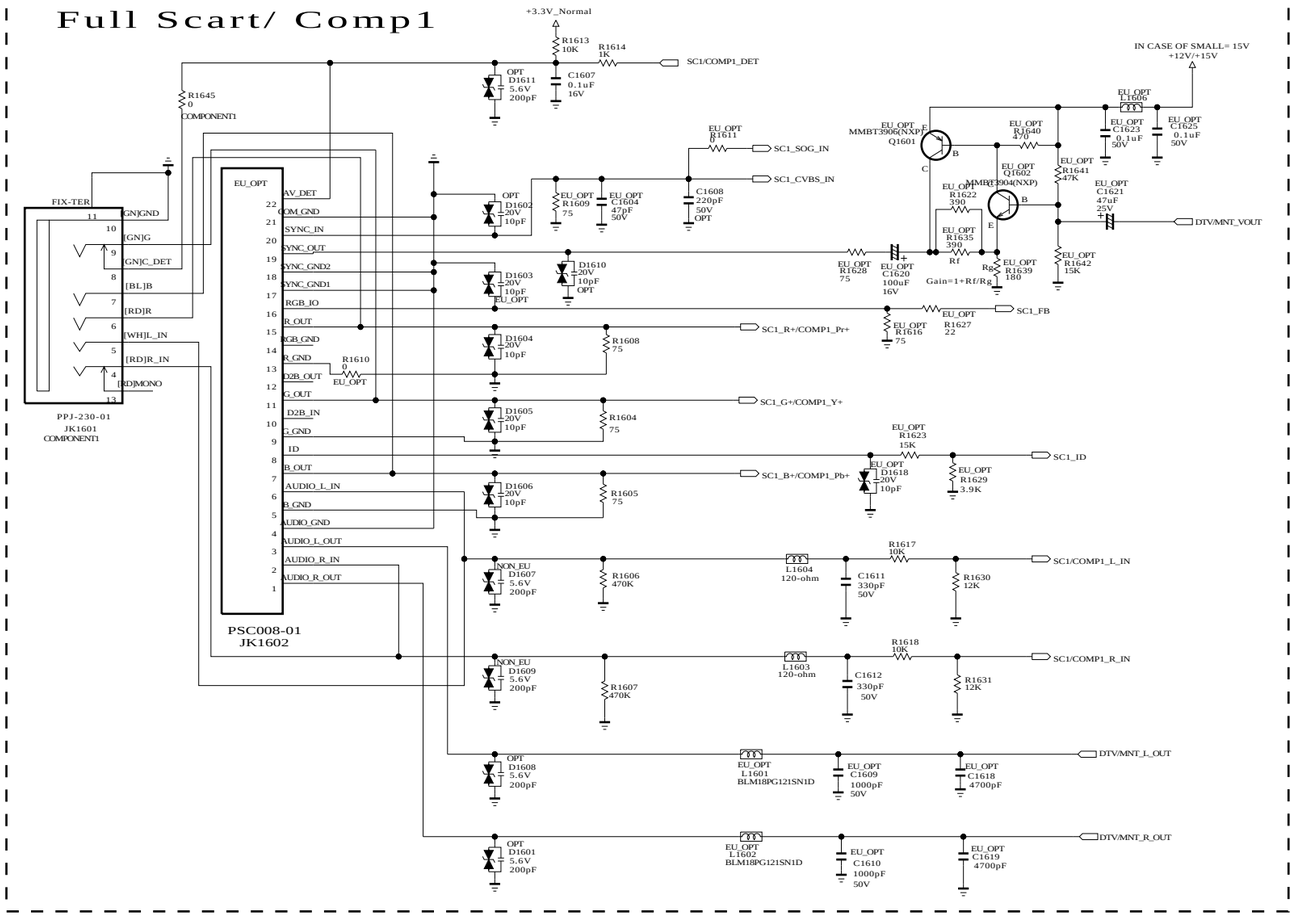
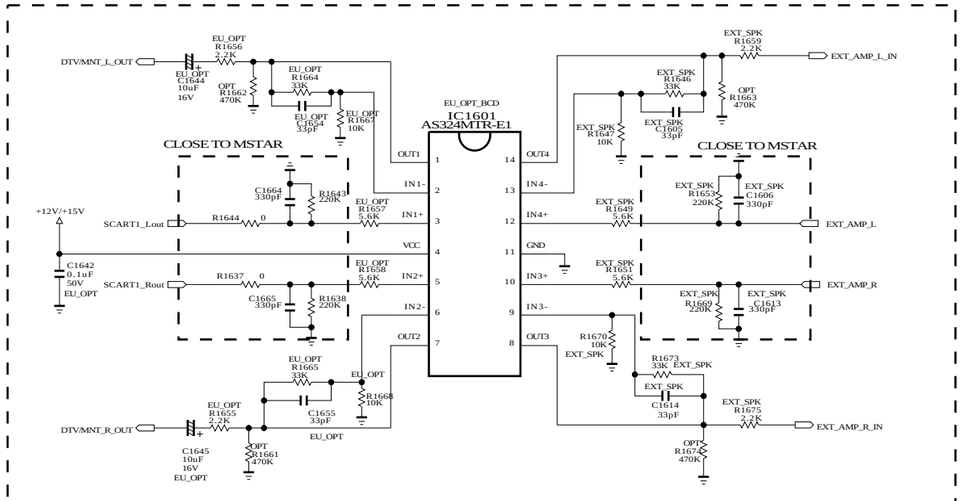
COMPONENT2

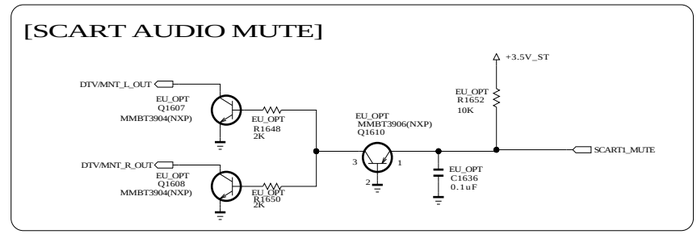




Full Scart/ Comp1







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MODEL	GP4_MSTAR	DATE	2011.08.21
BLOCK	REAR JACK	SHEET	16 / 20

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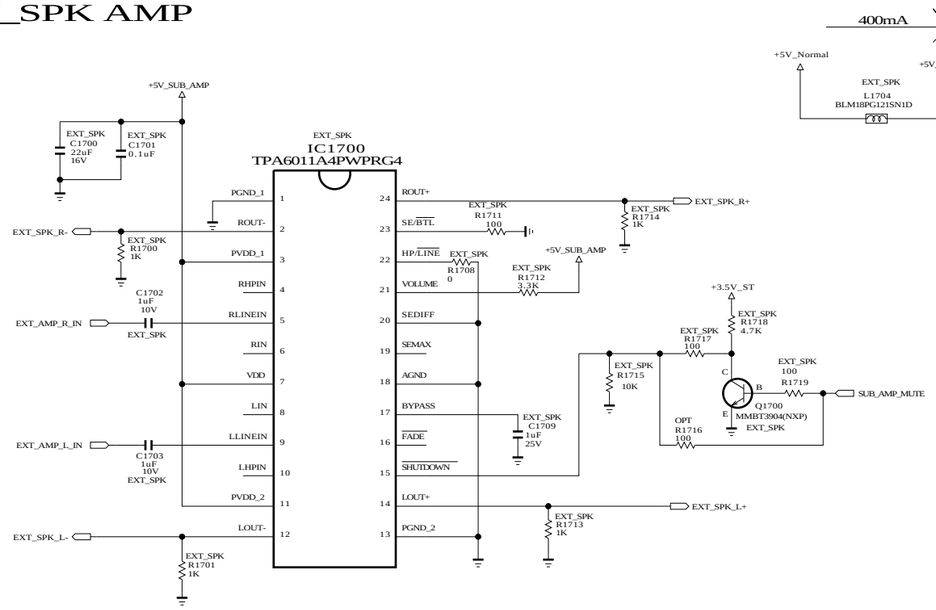
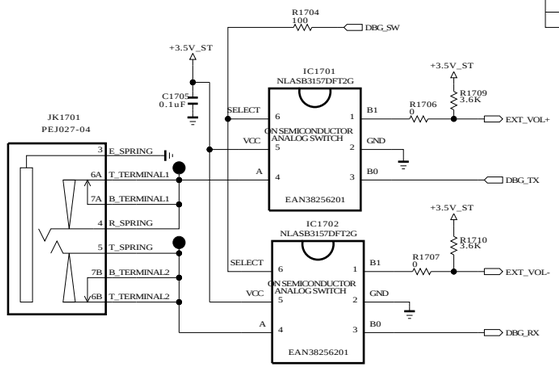
EXT_SPK AMP

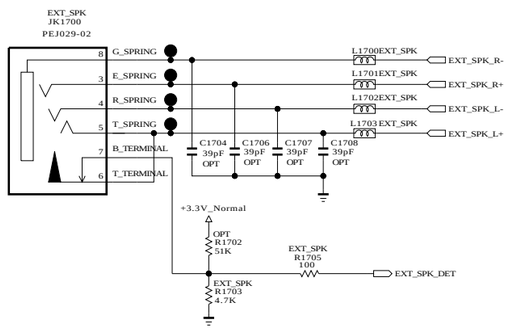


EXT_SPK_CONTROL/DEBUG

DBG_SW	CONNECTION
L	A - B 0 DEBUG_NEC/MSTAR
H	A - B 1 EXT_SPK CONTROL



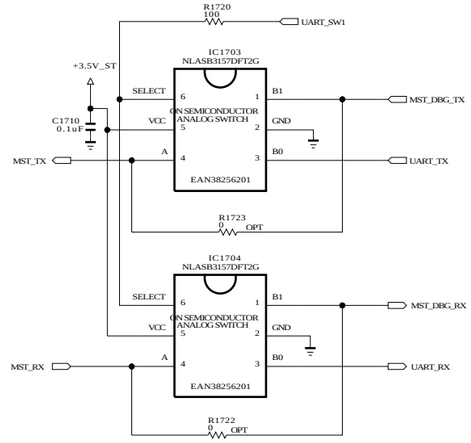
EXT_SPK OUT

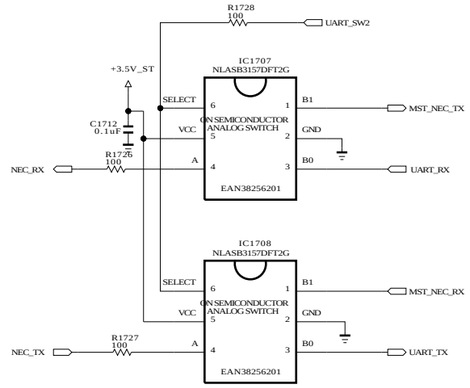


UART/I2C SWITCH

UART_SW1	CONNECTION
L	A - B0 MSTAR ADJ
H	A - B1 MSTAR DEBUG

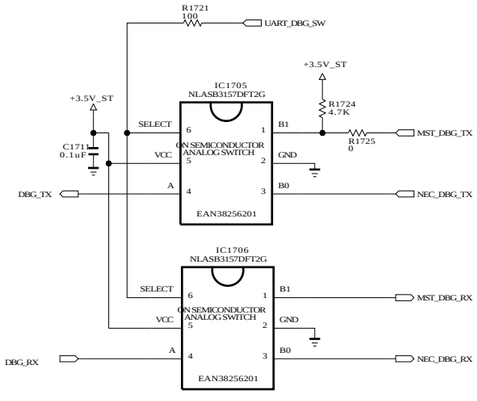
UART_SW2	CONNECTION
L	A - B0 INTERACTIVE
H	A - B1 NEC USB_DOWNLOAD

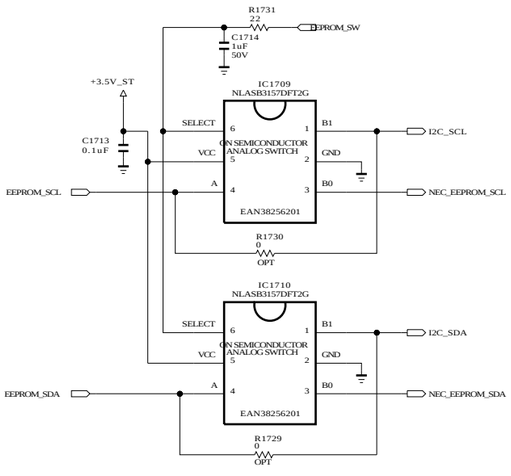




UART_SW	CONNECTION
L	A - B0 NEC DEBUG
H	A - B1 MSTAR DEBUG

EEPROM_SW	CONNECTION
L	A - B0 NEC-EEPROM
H	A - B1 MSTAR-EEPROM





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MODEL	GP4_MSTAR	DATE	2011.08.21
BLOCK	EXT SPK	SHEET	17 / 20

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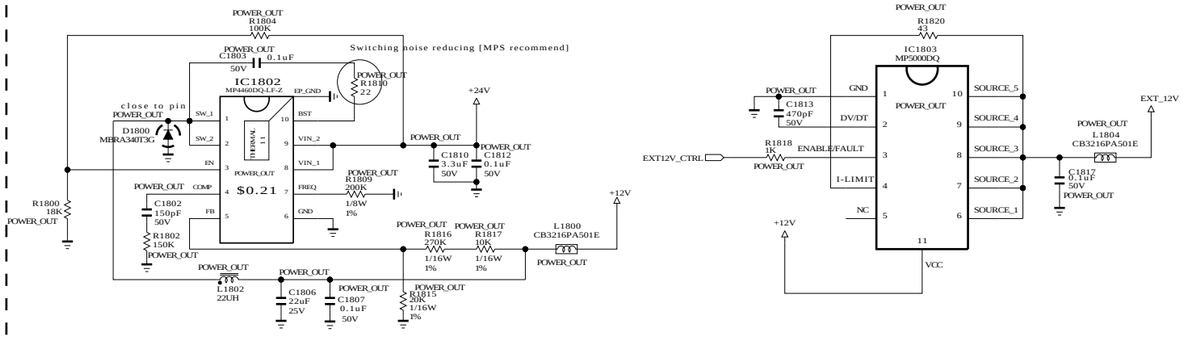
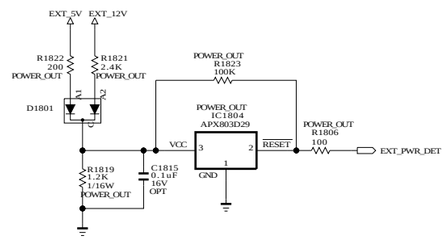
Vout=(1+R1/R2)*0.765=5.03V

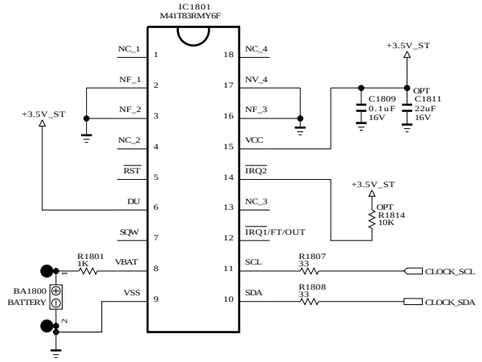
EXTERNAL_POWER OUT 5V/12V



EXTERNAL_POWER DETECTION



REAL TIME CLOCK(RTC)



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BLOCK	EXT_POWER	SHEET	19 / 20

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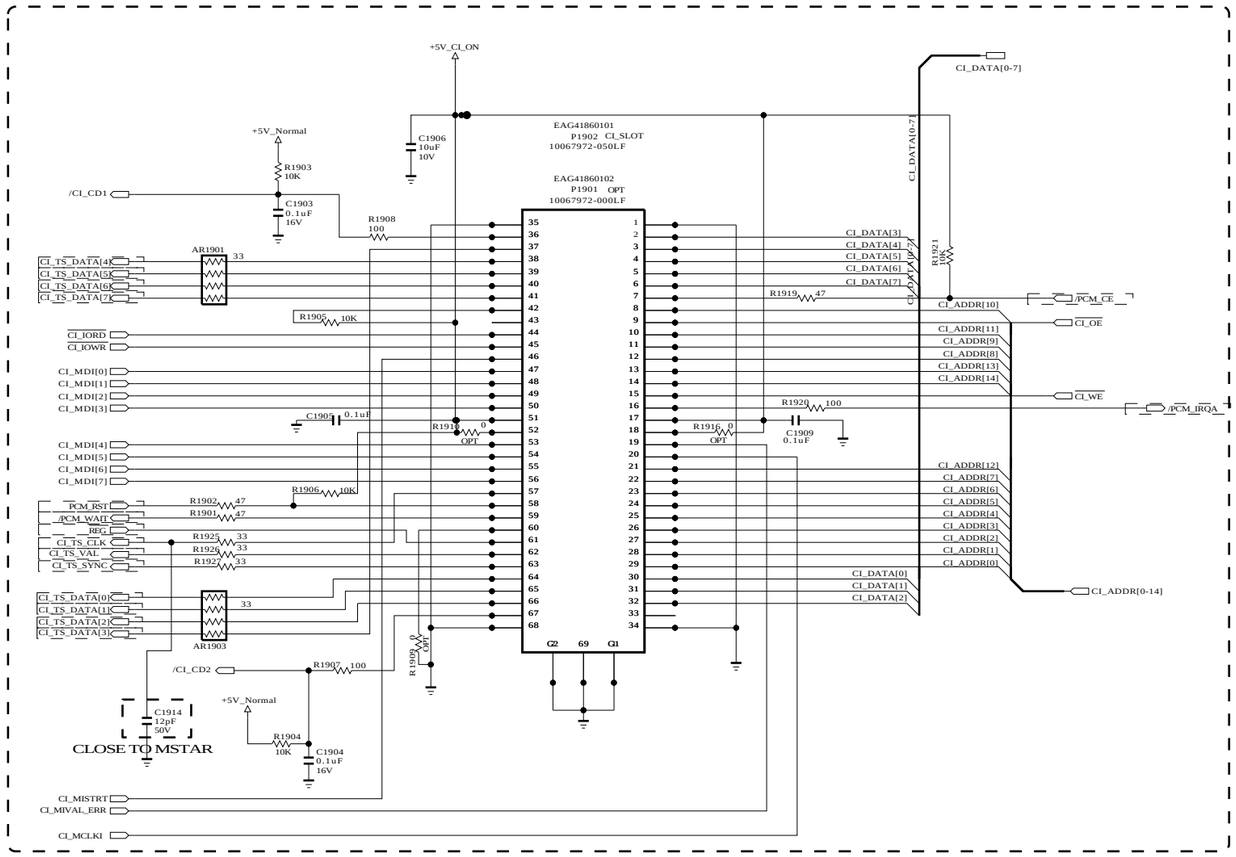
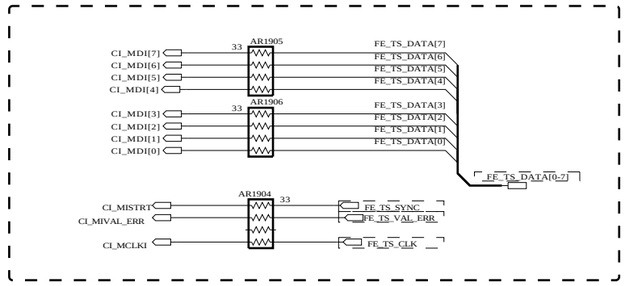
CI Region

* Option name of this page : CI_SLOT (because of Hong Kong)

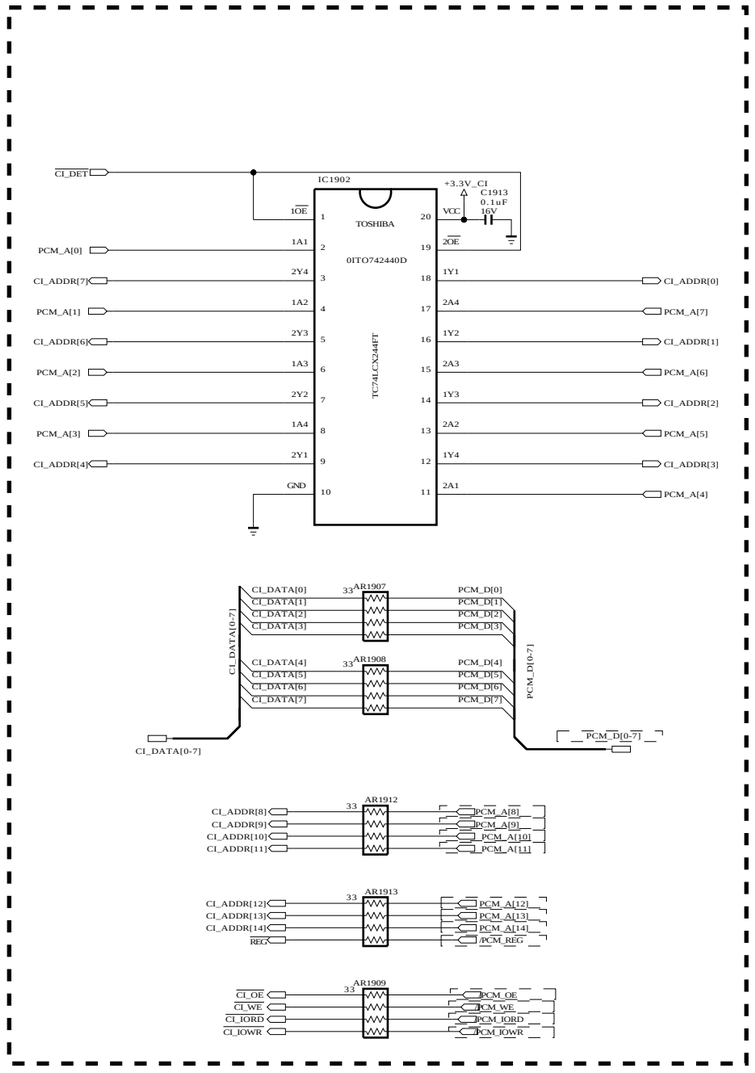
CI SLOT

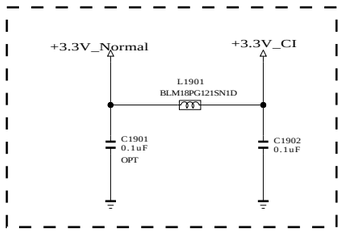


CI TS INPUT

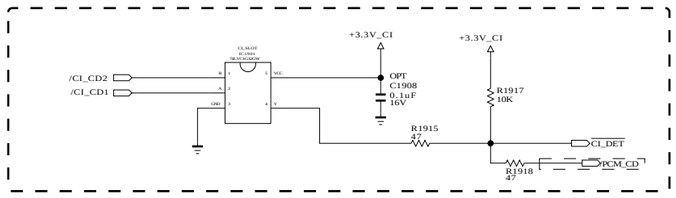


CI HOST I/F

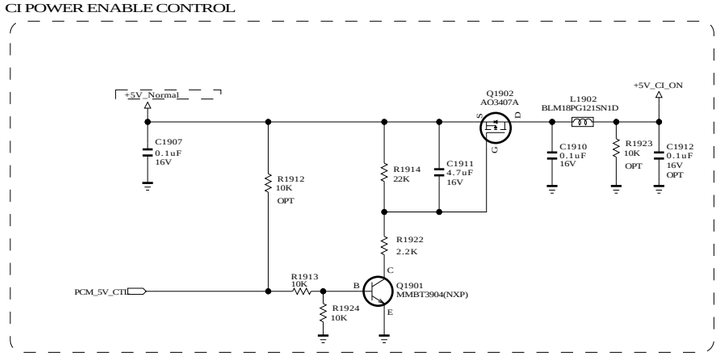




CI DETECT



CI POWER ENABLE CONTROL



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EMEA INTERACTIVE

MODEL	GP4_MSTAR	DATE	2011.08.21
BLOCK	PCMCI	SHEET	19 / 20

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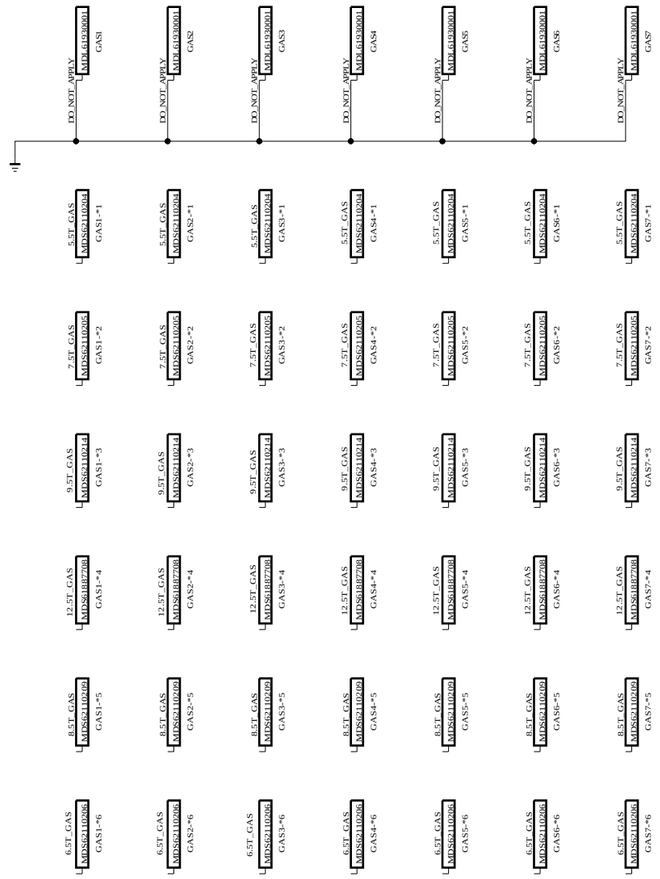
SMD GASKET



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MODEL	GP4_MSTAR	DATE	2011.08.21
BLOCK	SMD_GAS	SHEET	20 / 20

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Life's Good

1. Trouble Shooting

Contents of LCD TV Standard Repair Process

No.	Error symptom (High category)	Error symptom (Mid category)	Page	Remarks
1	A. Video error	No video/Normal audio	1	
2		No video/No audio	2	
3		Video error, video lag/stop	3	
4		Color error	4	
5		Vertical/Horizontal bar, residual image, light spot, external device color error	5	
6	B. Power error	No power	6	
7		Off when on, off while viewing, power auto on/off	7	
8	C. Audio error	No audio/Normal video	8	
9		Wrecked audio/discontinuation/noise	9	
10	D. Function error	No response in remote controller, key error, recording error, memory error	10	
11		External device recognition error	11	
12	E. Noise	Circuit noise, mechanical noise	12	
13	F. Exterior error	Exterior defect	13	

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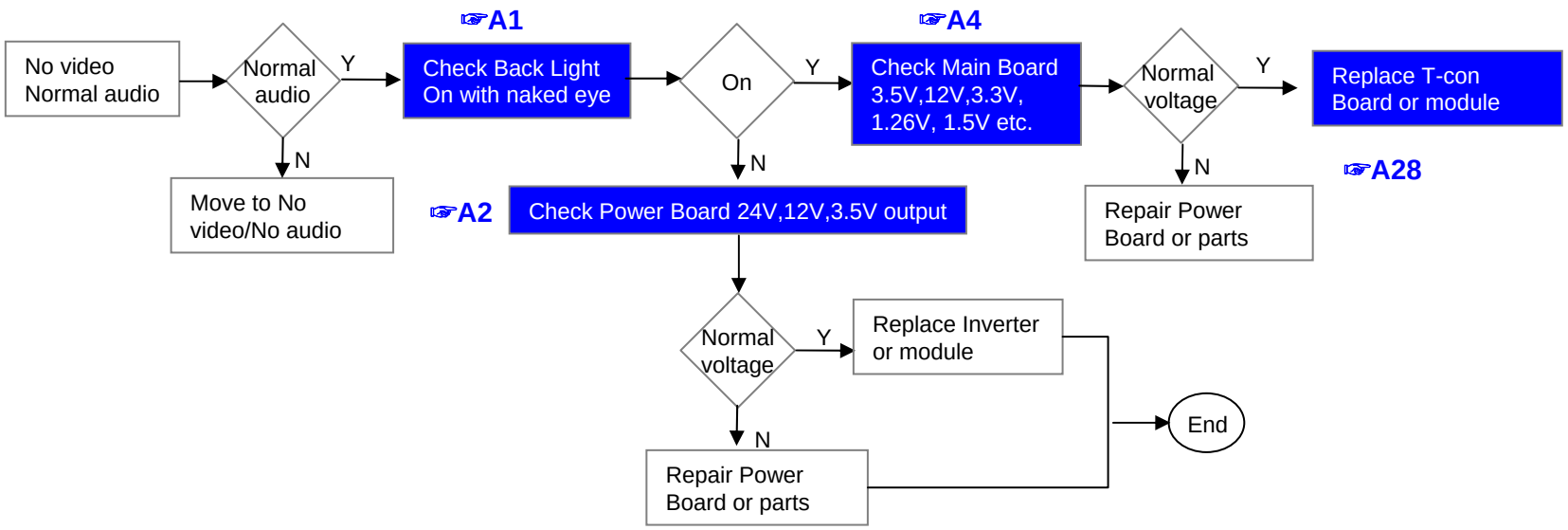
LCD TV	Error symptom	A. Video error	Established date		
		No video/ Normal audio	Revised date		1/13

First of all, Check whether all of cables between board is inserted properly or not.
(Main B/D↔ Power B/D, LVDS Cable,Speaker Cable,IR B/D Cable,,,)



※Precaution ☞A7 & A3

Always check & record S/W Version and White Balance value before replacing the Main Board → Replace Main Board → Re-enter White Balance value

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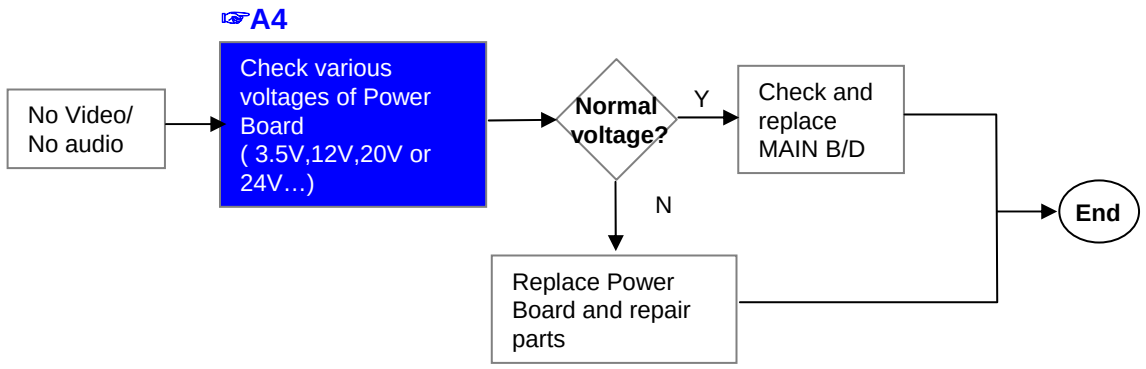
LCD TV	Error symptom	A. Video error	Established date		
		No video/ No audio	Revised date		2/13



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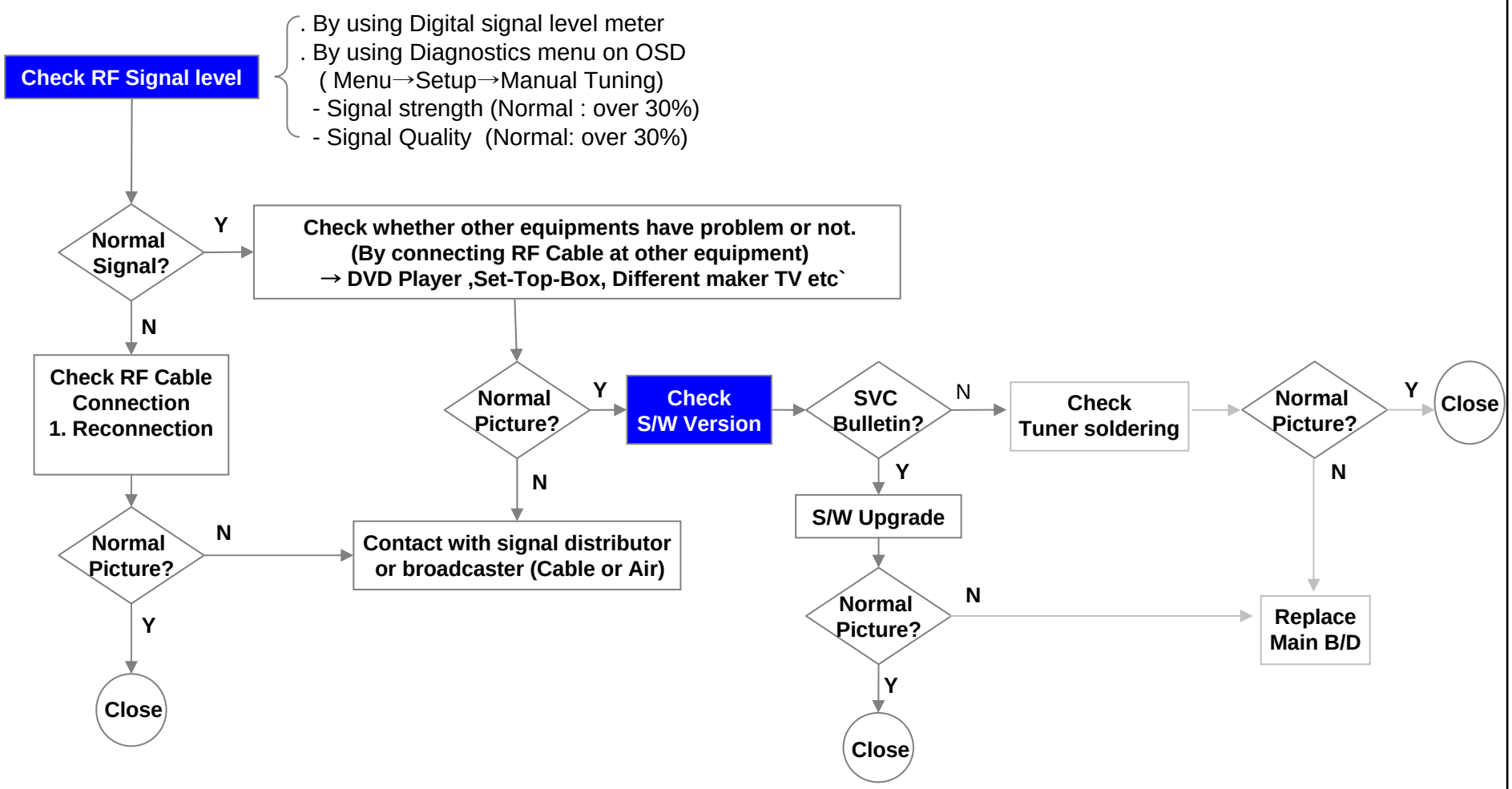
LCD TV	Error symptom	A. Picture Problem	Established date		
		Picture broken/ Freezing	Revised date		3/13



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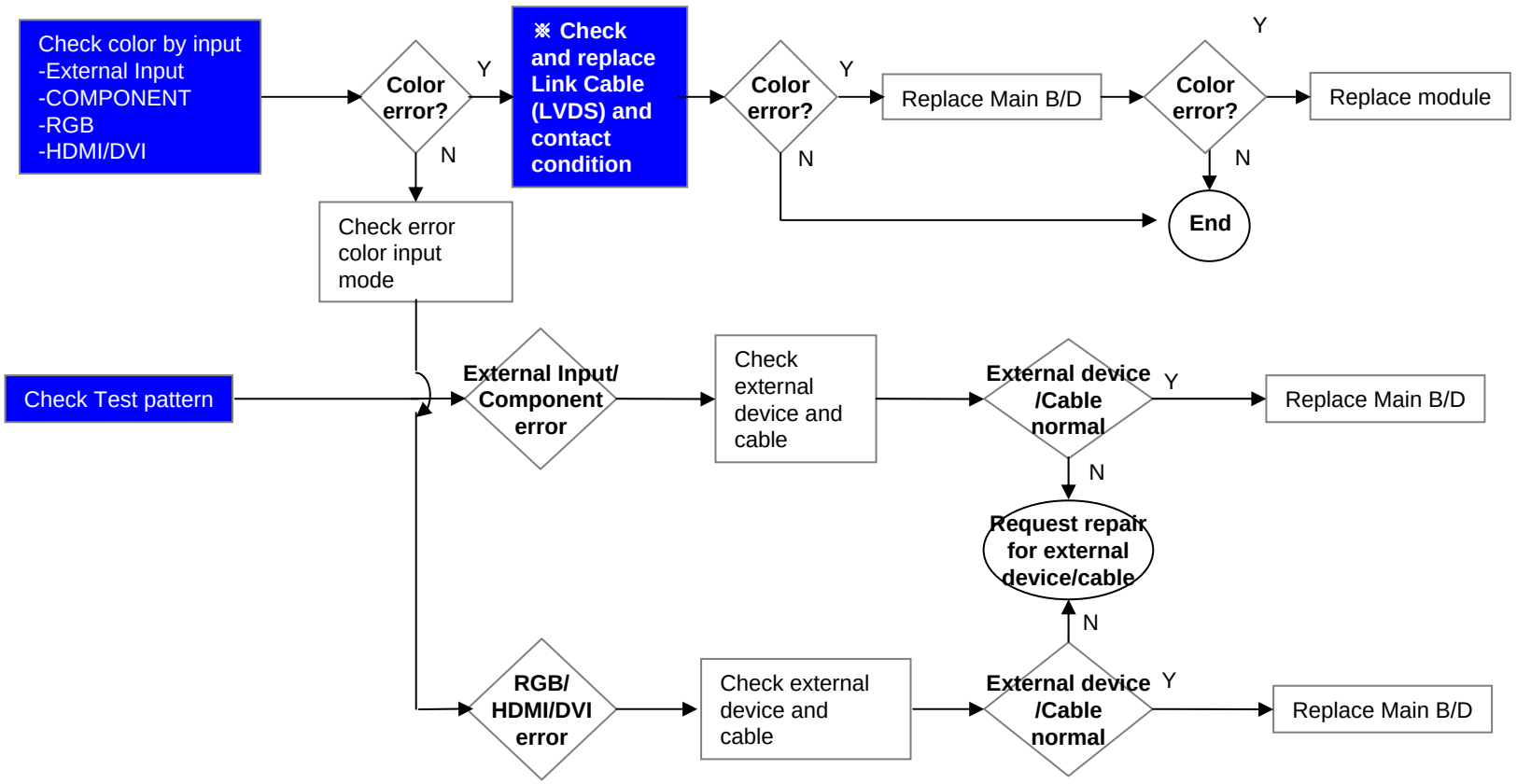
LCD TV	Error symptom	A. Video error	Established date		
		Color error	Revised date		4/13



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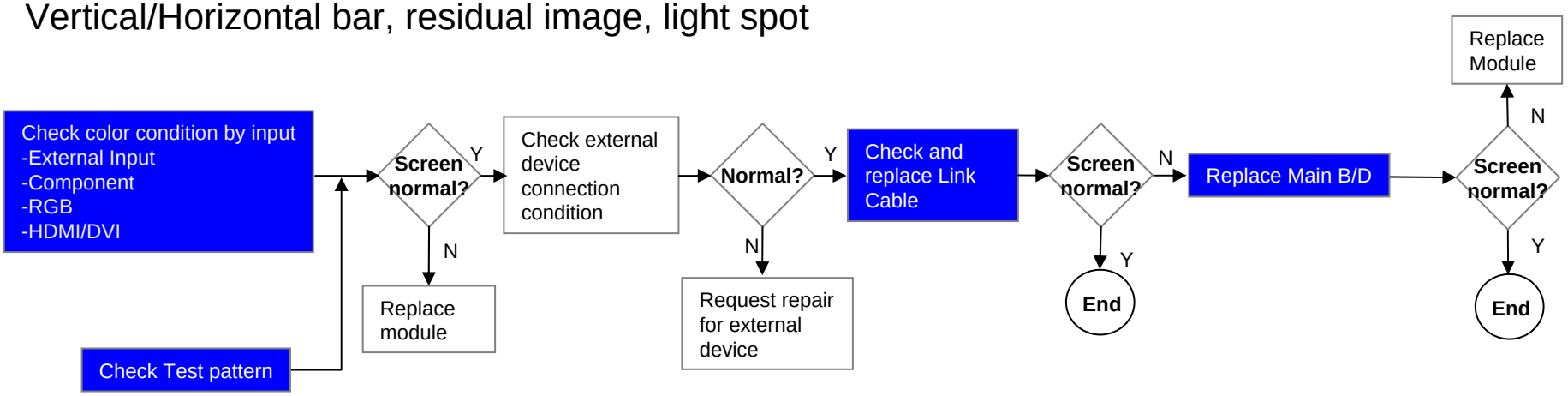
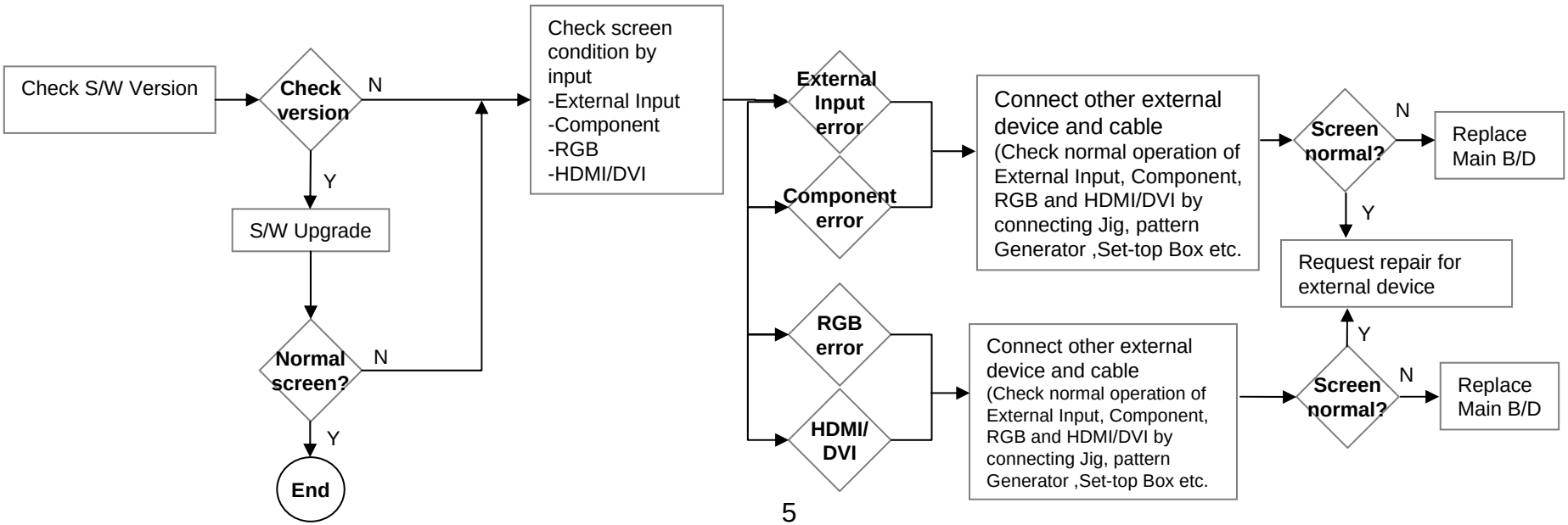
LCD TV	Error symptom	A. Video error	Established date		
		Vertical / Horizontal bar, residual image, light spot, external device color error	Revised date		5/13

Vertical/Horizontal bar, residual image, light spot



External device screen error-Color error



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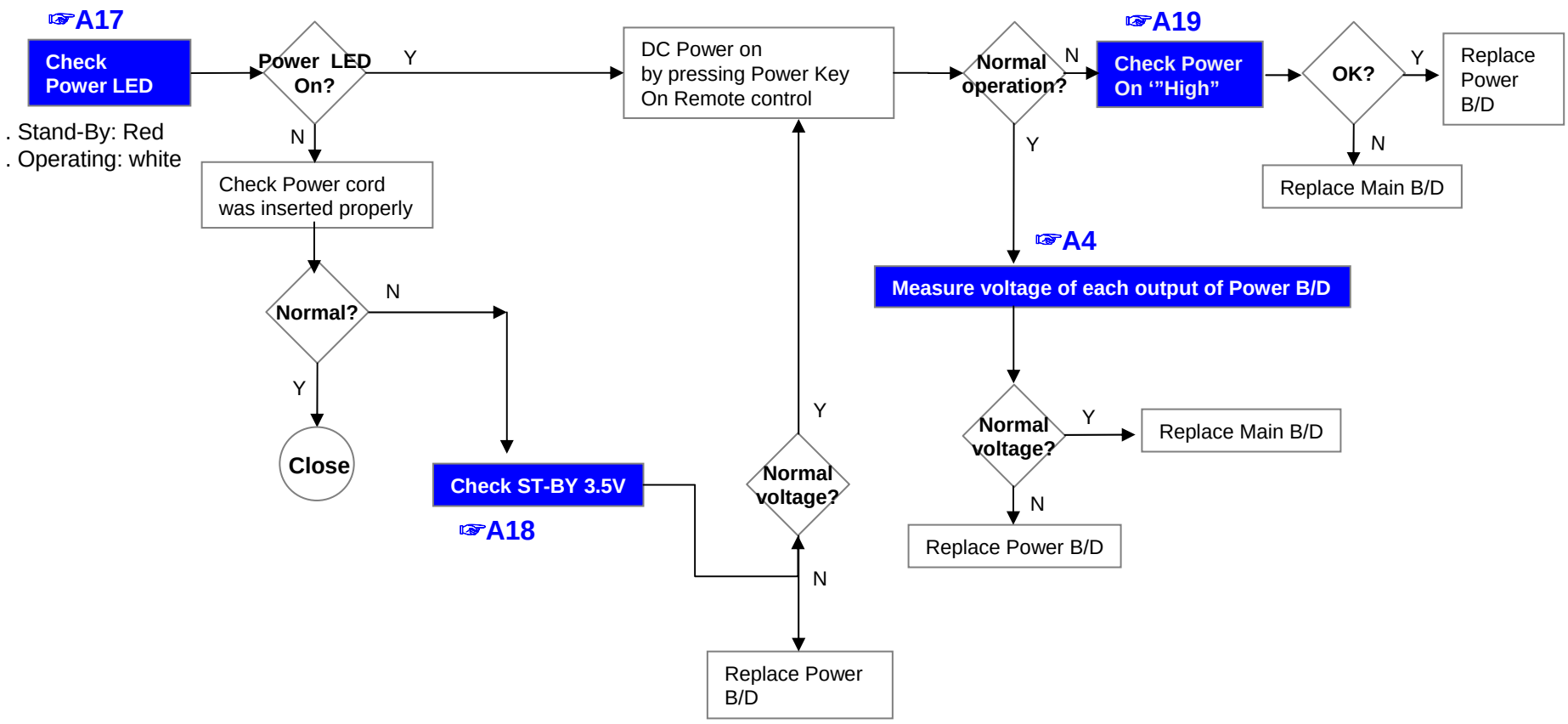
LCD TV	Error symptom	B. Power error	Established date		
		No power	Revised date		6/13



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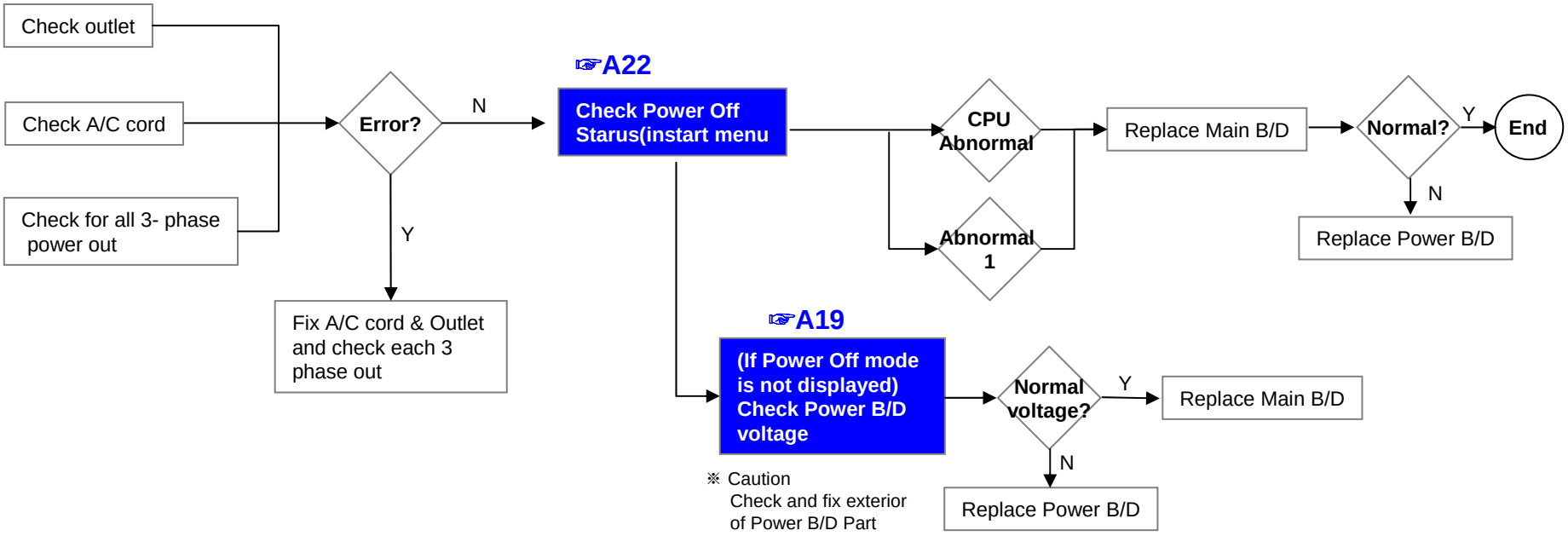
LCD TV	Error symptom	B. Power error	Established date		
		Off when on, off while viewing, power auto on/off	Revised date		7/13



*** Please refer to the all cases which can be displayed on power off mode.**

Status	Power off List	Explanation
Normal	"POWEROFF_REMOTEKEY"	Power off by REMOTE CONTROL
	"POWEROFF_OFFTIMER"	Power off by OFF TIMER
	"POWEROFF_SLEEPTIMER"	Power off by SLEEP TIMER
	"POWEROFF_INSTOP"	Power off by INSTOP KEY
	"POWEROFF_AUTOOFF"	Power off by AUTO OFF
	"POWEROFF_ONTIMER"	Power off by ON TIMER
	"POWEROFF_RS232C"	Power off by RS232C
	"POWEROFF_RESREC"	Power off by Reservated Record
	"POWEROFF_RECEND"	Power off by End of Recording
	"POWEROFF_SWDOWN"	Power off by S/W Download
	"POWEROFF_UNKNOWN"	Power off by unknown status except listed case
Abnormal	"POWEROFF_ABNORMAL1"	Power off by abnormal status except CPU trouble
	"POWEROFF_CPUABNORMAL"	Power off by CPU Abnormal

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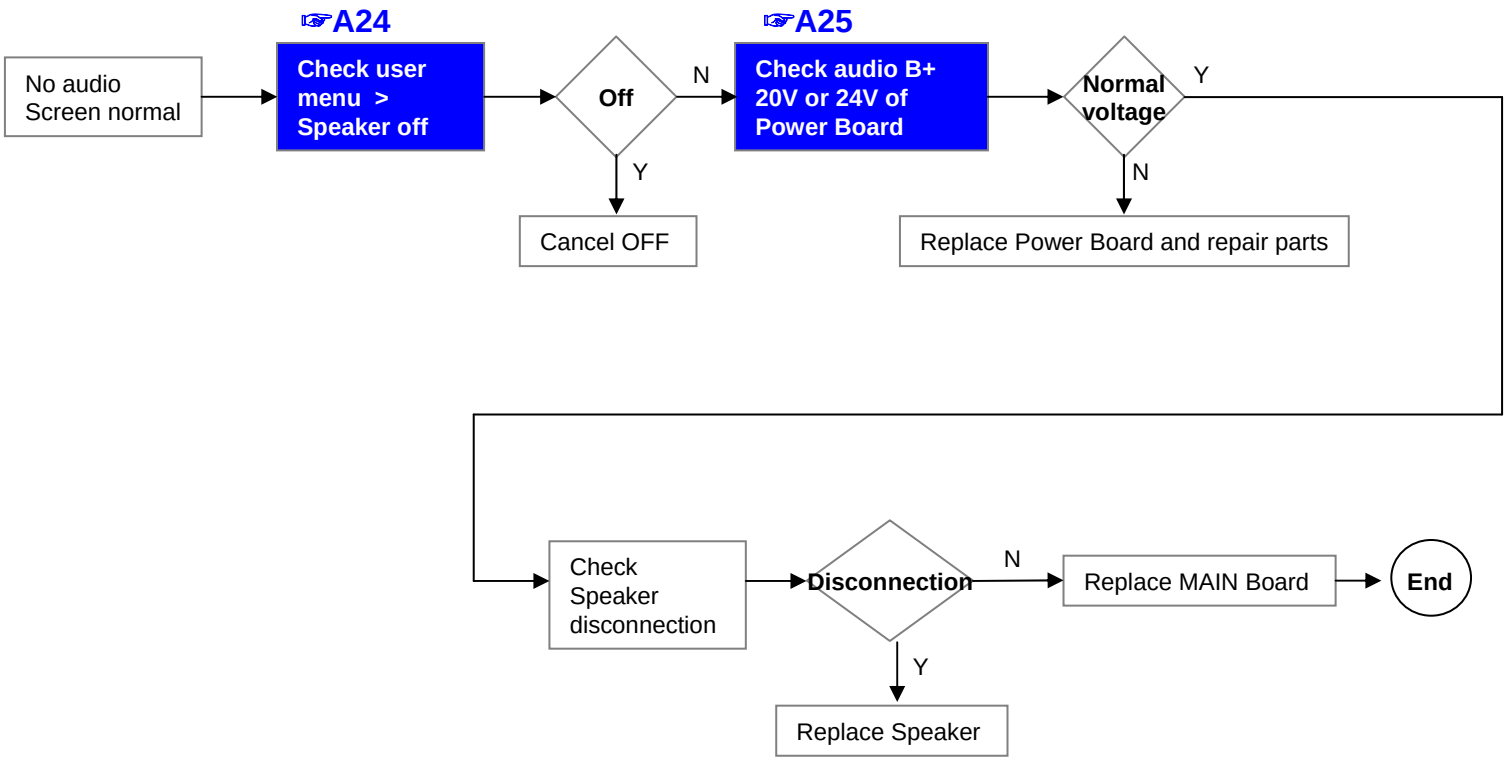
LCD TV	Error symptom	C. Audio error	Established date		
		No audio/ Normal video	Revised date		8/13



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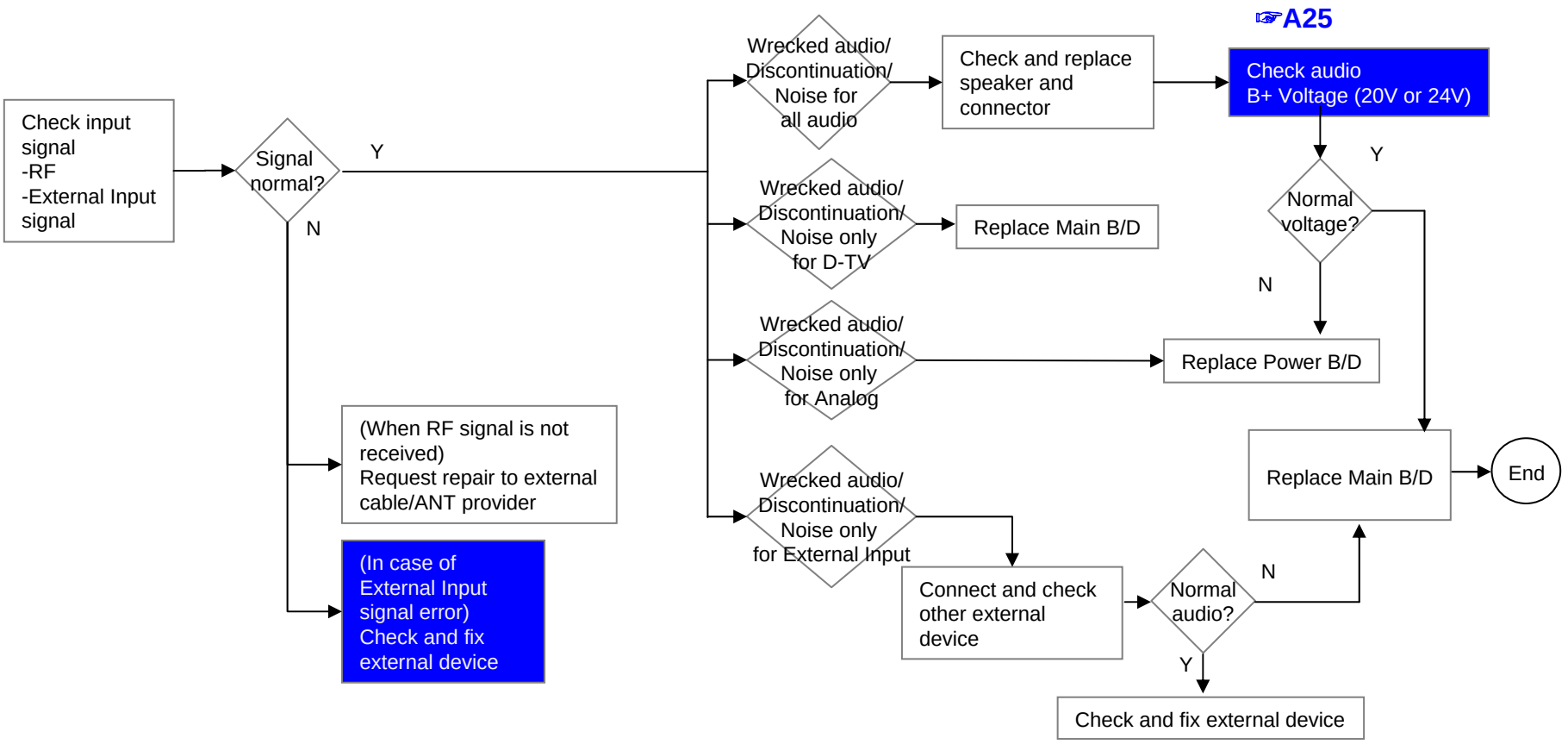
LCD TV	Error symptom	C. Audio error	Established date		
		Wrecked audio/ discontinuation/noise	Revised date		9/13

→ abnormal audio/discontinuation/noise is same after “Check input signal” compared to No audio



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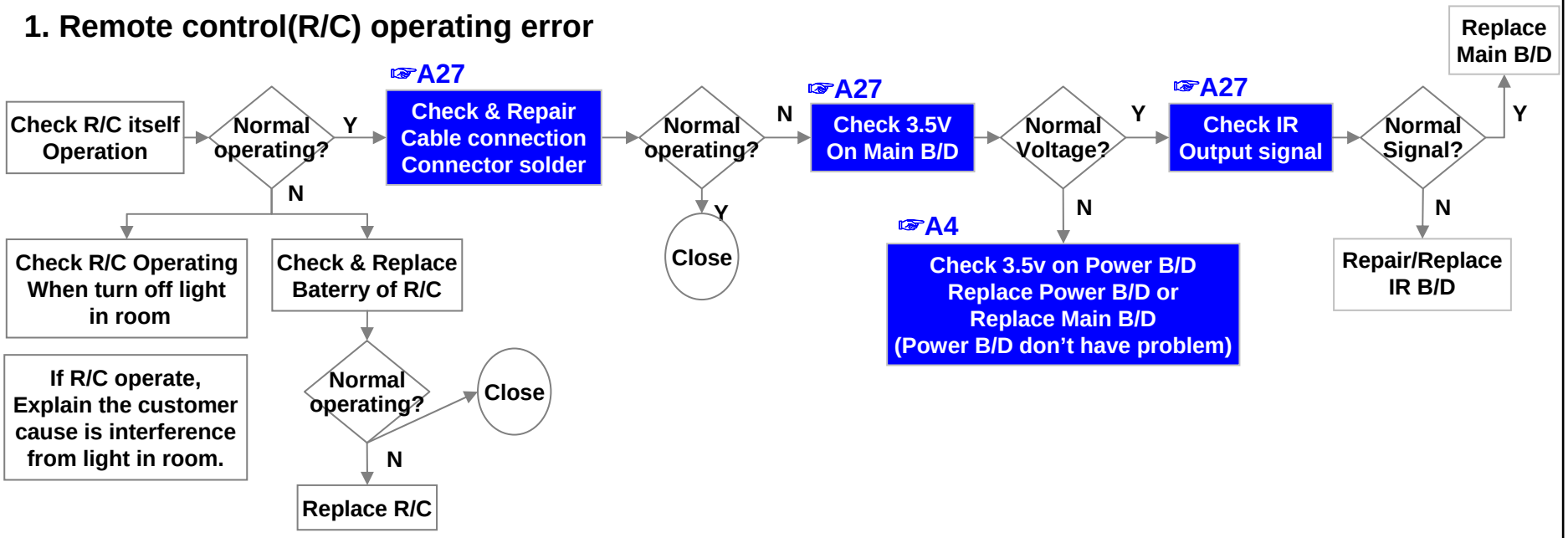
LCD TV	Error symptom	D. General Function Problem	Established date		
		Remote control & Local switch checking	Revised date		10/13

1. Remote control(R/C) operating error



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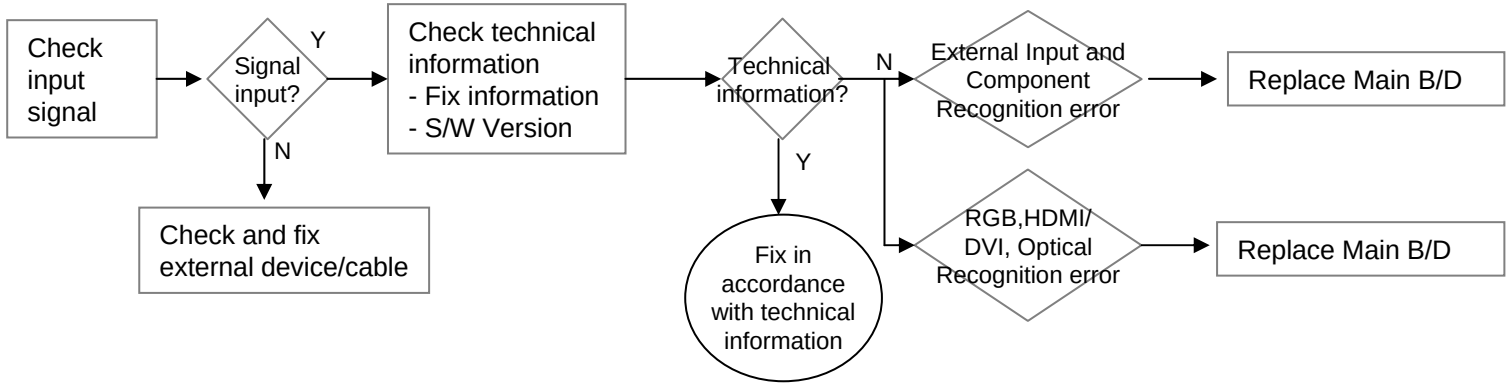
LCD TV	Error symptom	D. Function error	Established date		
		External device recognition error	Revised date		11/13



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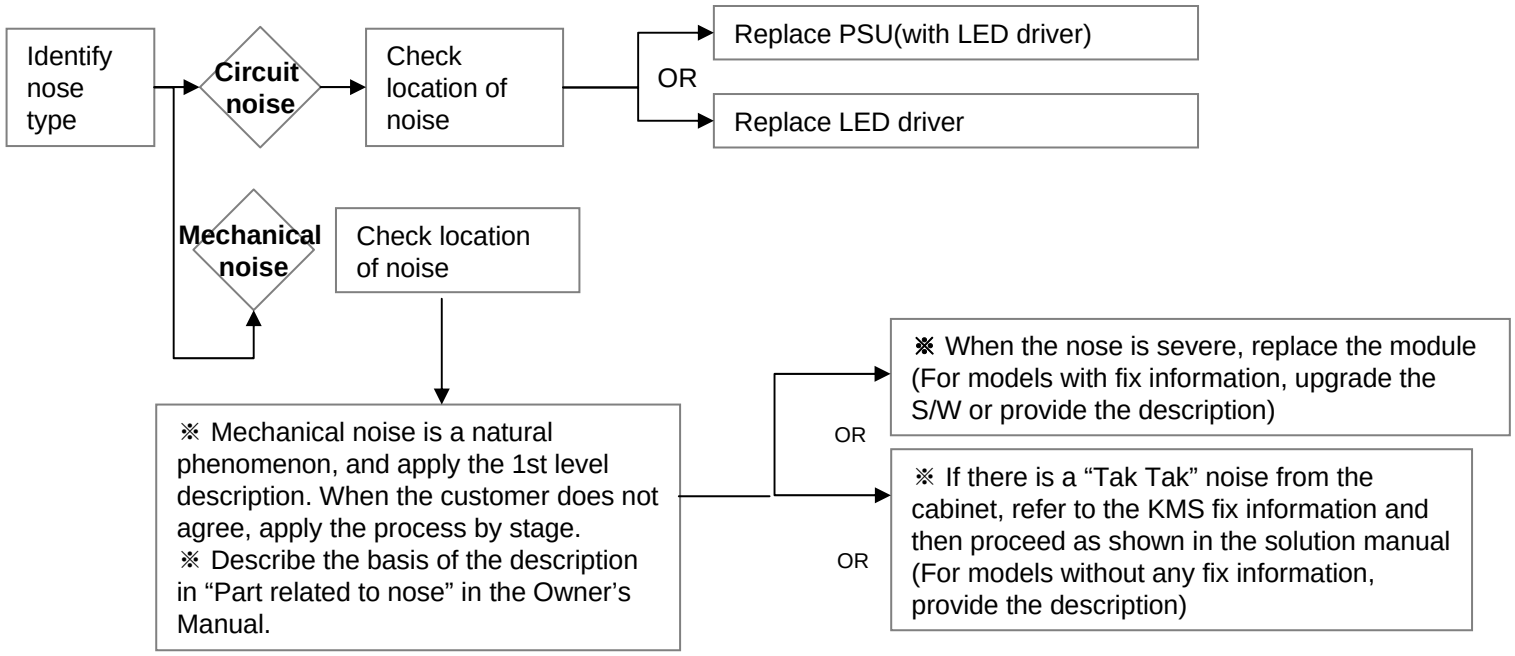
LCD TV	Error symptom	E. Noise	Established date		
		Circuit noise, mechanical noise	Revised date		12/13


Identify nose type
Circuit noise
Check location of noise
OR
Replace PSU(with LED driver)
Replace LED driver
Mechanical noise
Check location of noise
※ Mechanical noise is a natural phenomenon, and apply the 1st level description. When the customer does not agree, apply the process by stage.
※ Describe the basis of the description in “Part related to nose” in the Owner’s Manual.
OR
※ When the nose is severe, replace the module (For models with fix information, upgrade the S/W or provide the description)
OR
※ If there is a “Tak Tak” noise from the cabinet, refer to the KMS fix information and then proceed as shown in the solution manual (For models without any fix information, provide the description)

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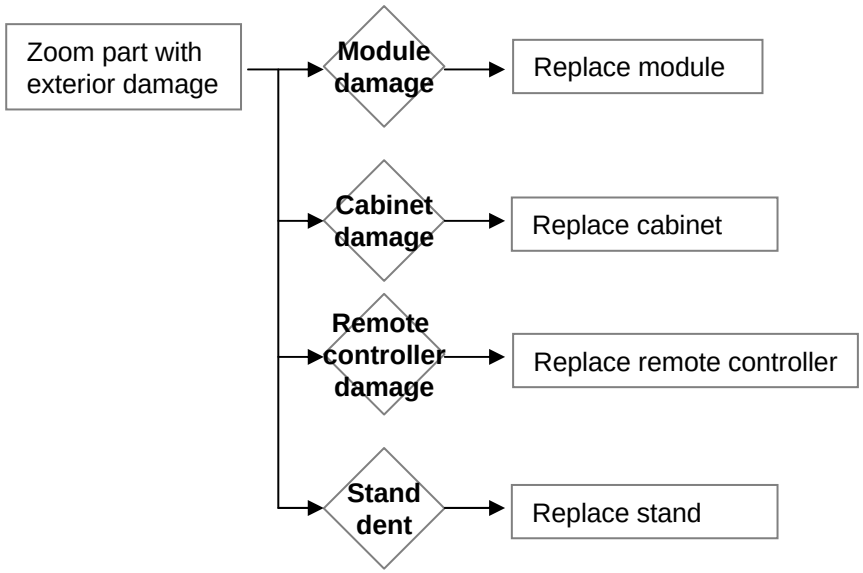
LCD TV	Error symptom	F. Exterior defect	Established date		
		Exterior defect	Revised date		13/13



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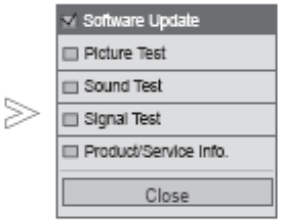
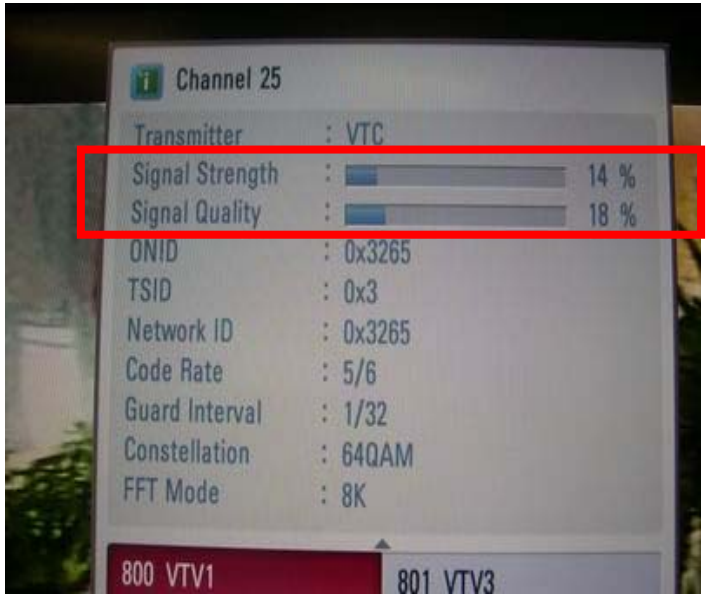
Standard Repair Process Detail Technical Manual

LCD TV	Error symptom	A. Video error_Video error, video lag/stop	Established date		
	Content	TUNER input signal strength checking method	Revised date		A6

<ALL MODELS>



MENU -→ red key(customer support -→ signal test -→ select channel



When the signal is strong, use the attenuator (-10dB, -15dB, -20dB etc.)

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Standard Repair Process Detail Technical Manual

LCD TV	Error symptom	A. Video error_Video error, video lag/stop	Established date		
	Content	LCD-TV Version checking method	Revised date		A7

<ALL MODELS>

1. Checking method for remote controller for adjustment

Version

Press the IN-START with the remote controller for adjustment

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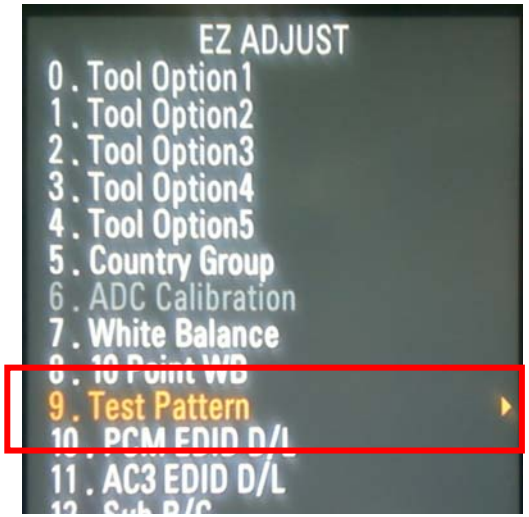
Standard Repair Process Detail Technical Manual

LCD TV	Error symptom	A. Video error_Color error	Established date		
	Content	Adjustment Test pattern - ADJ Key	Revised date		A12



You can view 6 types of patterns using the ADJ Key

Checking item : 1. Defective pixel 2. Residual image 3. MODULE error (ADD-BAR,SCAN BAR..)
4.Video error (Classification of MODULE or Main-B/D!)

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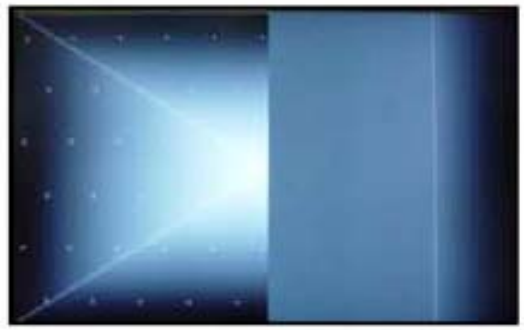
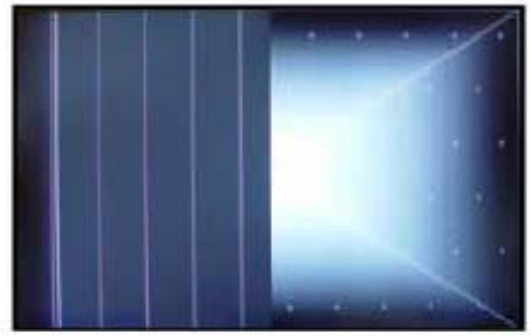
Appendix : Exchange T-Con Board (1)

Solder defect, CNT Broken

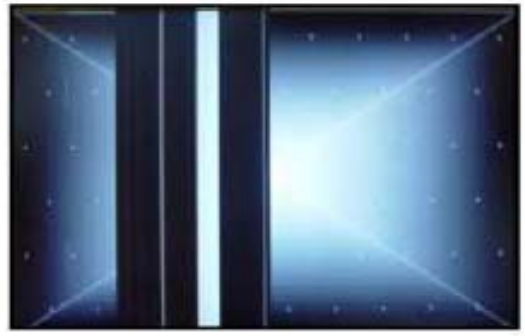


Solder defect, CNT Broken

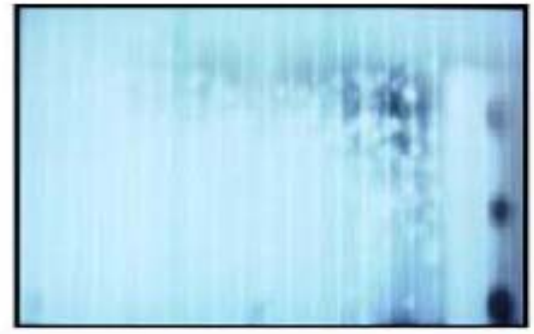


Solder defect, CNT Broken

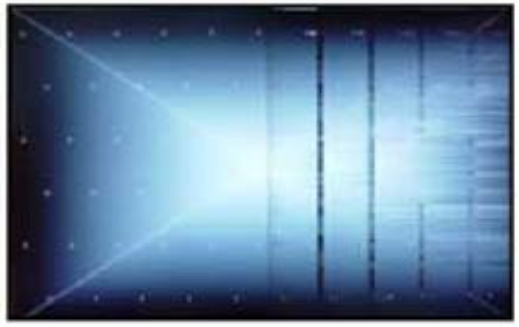
Solder defect, CNT Broken



Solder defect, CNT Broken



Abnormal Power Section



Solder defect, Short/Crack

Abnormal Power Section

Solder defect, Short/Crack

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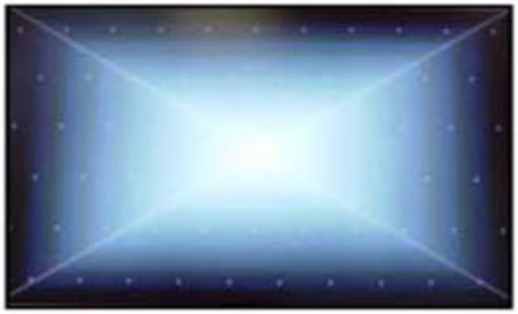
Appendix : Exchange T-Con Board (2)



Abnormal Power Section

Abnormal Power Section

Solder defect, Short/Crack

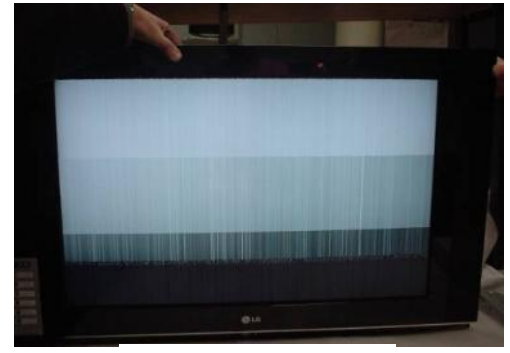
Solder defect, Short/Crack

Fuse Open, Abnormal power section

Abnormal Display

GRADATION

Noise



GRADATION

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Appendix : Exchange PSU(LED driver)

No Light

Dim Light

Dim Light

Dim Light

No picture/Sound Ok

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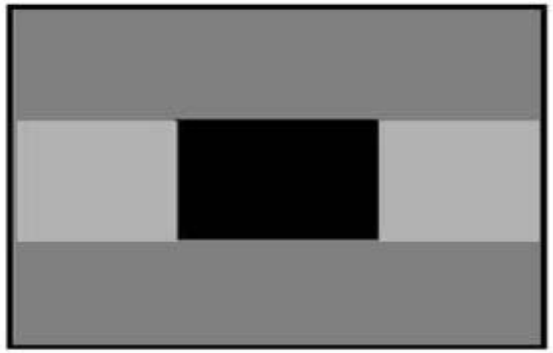
Appendix : Exchange the Module (1)

Panel Mura, Light leakage

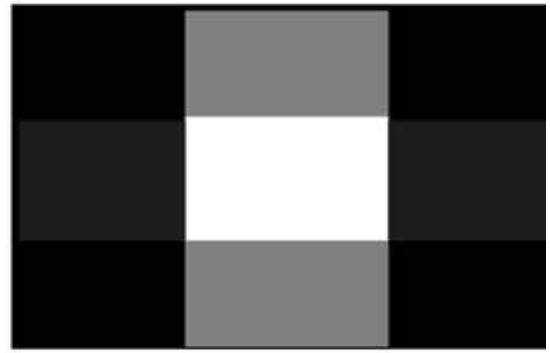
Panel Mura, Light leakage

Press damage



Crosstalk

Press damage



Crosstalk

Press damage

Un-repairable Cases

In this case please exchange the module.

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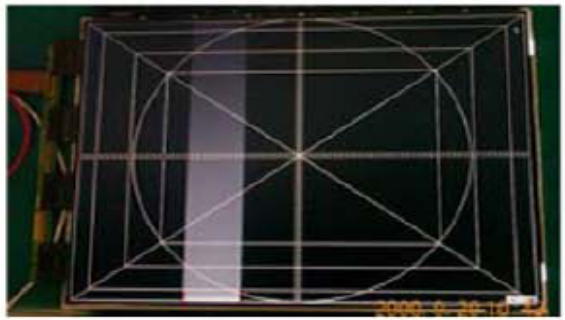
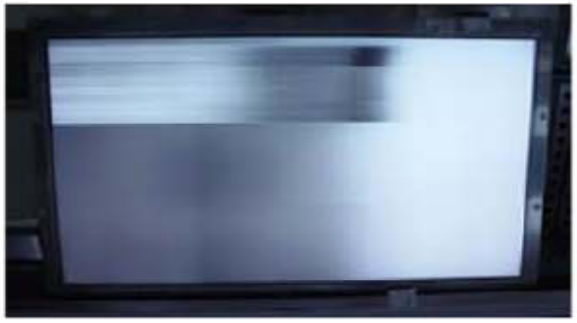
Appendix : Exchange the Module (2)



Vertical Block
Source TAB IC Defect

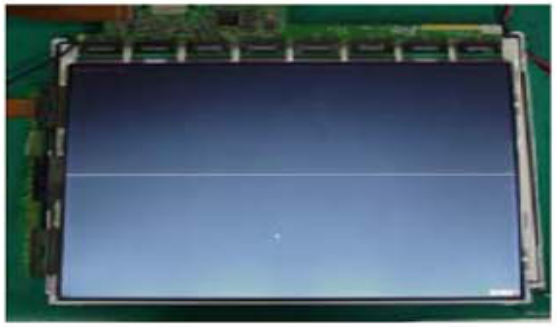
Vertical Line
Source TAB IC Defect

Vertical Block
Source TAB IC Defect



Horizontal Block
Gate TAB IC Defect

Horizontal Block
Gate TAB IC Defect



Horizontal line
Gate TAB IC Defect

Horizontal Block
Gate TAB IC Defect

Un-repairable Cases

In this case please exchange the module.

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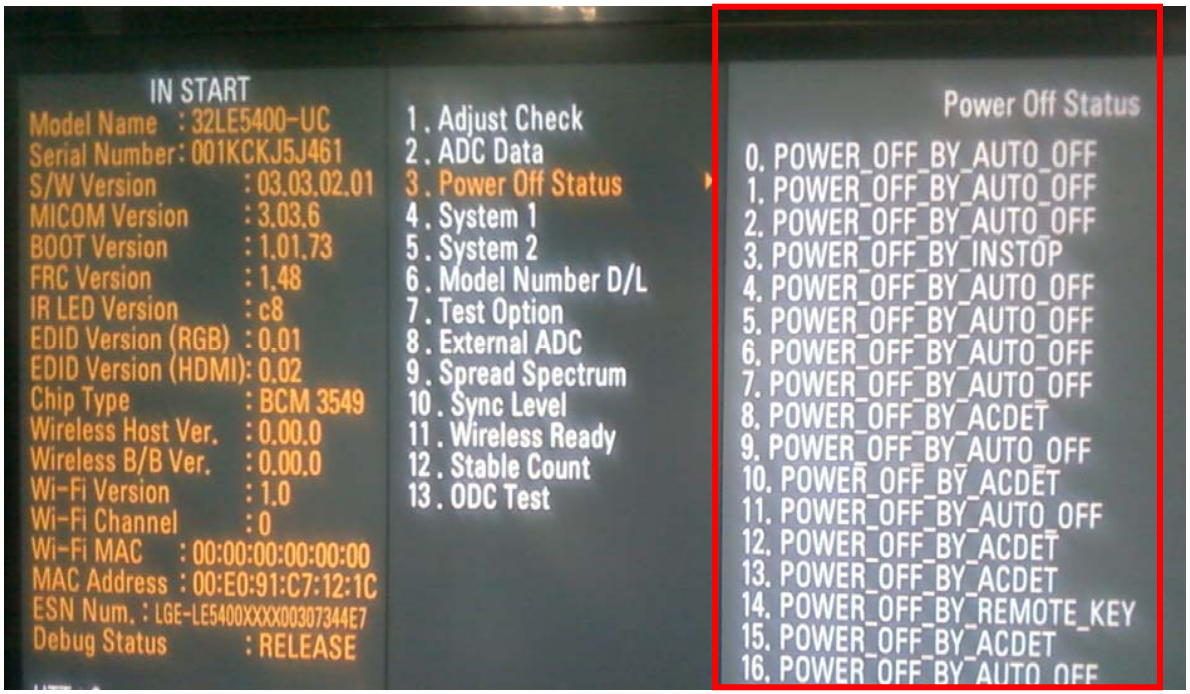
Standard Repair Process Detail Technical Manual

LCD TV	Error symptom	B. Power error _Off when on, off whiling viewing	Established date		
	Content	POWER OFF MODE checking method	Revised date		A22

<ALL MODELS>



Entry method

1. Press the IN-START button of the remote controller for adjustment

2. Check the entry into adjustment item 3

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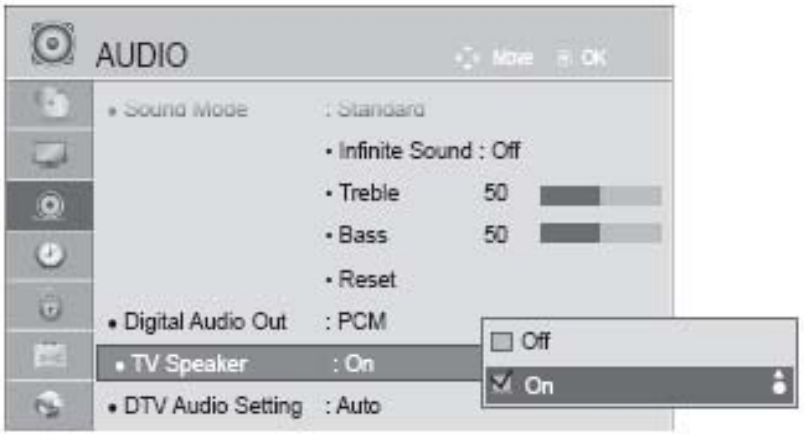
<ALL MODELS>



Checking method

1. Press the MENU button on the remote controller
2. Select the AUDIO function of the Menu
3. Select TV Speaker from Off to On

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